DOCUMENT RESUME

ED 322 297 CE 055 242

AUTHOR	Gold, Patricia; Packer, Arnold
TITLE	Literacy Audit of Maintenance Workers. Final Report.
INSTITUTION	Interactive Training Inc., Alexandria, VA.
SPONS AGENCY	Employment and Training Administration (DOL), Washington, DC. Office of Strategic Planning and Policy Development.
PUB DATE	23 Mar 90
CONTRACT	99-8-4704-75-077-01
NOTE	335p.; Some tables and parts of the appendices contain blurred type and may not reproduce well.
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01/PC14 Plus Postage.
DESCRIPTORS	Adult Basic Education; *Adult Literacy; Basic Skills; Buildings; *Education Work Relationship; Employment Qualifications; *Functional Literacy; *Job Skills; Limited English Speaking; Literacy Education; *Maintenance; Promotion (Occupational); Reading Achievement; Reading Materials; Reading Skills; Vocational Education
IDENTIFIERS	*Literacy Audits; National Assessment of Educational Progress; *Workplace Literacy

ABSTRACT

An 18-month national literacy audit of maintenance worker jobs in multifamily apartment complexes sought to find out: (1) the literacy demands for their job success and promotion; (2) the effects of geographical location on their literacy demands; (3) the effects of management policies on their literacy demands; (4) the impact of illiteracy on workers, residents, and the industry in general; and (5) whether the National Assessment of Educational Progress (NAEP) taxonomy and scales can be used to analyze actual workplace tasks and materials. Data were collected from mailed questionnaires, telephone interviews, 10 site visits to field locations (6 in Indiana, 2 in New York, and 2 in Texas) of 2 national building management companies, and the analysis of workers' on-the-job reading materials. The following results were cited: (1) maintenance workers need a diverse range of reading, writing, computation, and visualization skills; (2) differences in geographic locations appear to have little effect on the literacy demands on these workers, although geographic areas where hirees are likely to have limited proficiency with English are a special situation; (3) the age of the buildings being maintained has a great effect on literacy demands; (4) policies and procedures used by the building management companies produce different literacy demands; (5) low basic skills tend to reduce job productivity and increase safety risks and resident dissatisfaction; and (6) the NAEP taxonomy appears to be relevant for analyzing workplace literacy tasks but the scales will require a great deal more work. (Appendices provide lists of maintenance worker tasks, the supervisor mail survey, telephone interview protocol, site data, and detailed analyses of job materials.) (CML)

ED322297

FINAL REPORT

LITERACY AUDIT OF MAINTENANCE WORKERS

SUBMITTED BY: INTERACTIVE TRAINING INC. (ITI)
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U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
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EMPLOYMENT AND TRAINING DIVISION

MARCH 23, 1990

CE055242

This project was funded under Contract #99-8-4704-75-077-01 from the U.S. Department of Labor, Office of Strategic Planning and Policy Development. Opinions stated in this document do not necessarily represent the official position or policy of the U.S. Department of Labor.

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EXECUTIVE SUMMARY

On July 1, 1988, Interactive Training Inc. (ITI) began an eighteen month national literacy audit. The study was funded by the Department of Labor (DOL) as part of their effort to increase workplace literacy.

The purpose of the audit was to determine the literacy requirements of maintenance workers in multi-family apartment buildings. The study was designed to answer five major questions:

A. What literacy demands are required of maintenance workers to perform successfully on the job and lead to promotion?

B. What are the effects of geographic location on literacy demands?

C. What are the effects of management company policies and procedures on literacy demands?

D. What impact might the lack of literacy have on worker, residents, and the industry in general?

E. Can the National Assessment of Educational Progress (NAEP) taxonomy and scales be used to analyze actual workplace tasks and materials?

ITI worked with two national property management firms to collect data via mail questionnaires, site visits, and telephone interviews. Mail questionnaires were used to identify job tasks to be studied and sites to be included for visits and telephone interviews. Results of 82 mail surveys revealed concerns by maintenance supervisors about tasks related to making electrical repairs, maintaining heating and air conditioning units, and handling chemicals. Also, returns showed that job advancement was related to the ability to solicit and evaluate bids from outside contractors, handle paperwork, and maintain budgets.

Visits were made to ten property management sites (six in Indiana, two in New York, and two in Texas). Site visits involved interviewing maintenance supervisors and workers and identifying the types of basic skills involved in completing job tasks. Also, job materials such as maintenance manuals and documents were collected. In addition, 13 maintenance supervisors were contacted by telephone after site data had been analyzed in order to augment and verify the data.

Analysis of data was quantitative and descriptive. Job materials were analyzed to identify the underlying basic skills required to complete job tasks. These included forms used in responding to service requests, maps used to locate apartments, and manuals used to solve electrical problems. The results of the analysis suggest the following answers to the five questions noted above.

A. Maintenance workers need a diverse range of reading, writing, computation, and visualization skills to perform successfully and be promoted. They read: 1) forms and documents, 2) maps and blueprints, charts and meters/gages, 3) identification labels, and 4) references and resource manuals. Most job tasks require a combination of reading, writing, computation, and visualization skills and the integration of information from a number of different sources. Examples include completing the paperwork to request bids from outside contractors, reading schematics and charts to maintain heating and air conditioning units, and reading labels and Materials Safety Data Sheets in the use of chemicals. While the environment of maintenance workers is print rich, its sociology does not support the use of reading on the job. Instead, "common sense" and "hands on" approaches are used to explain the lack of reading actually performed on the job.

B. Geographic location does not appear to affect overall literacy demands of maintenance workers. Trade-offs and changes in context do occur, however. A decrease in one type of demand, for example pool maintenance in inner city sites, is offset by an increase in another, such as building hygiene. The age of the building appears to have much more of an effect. Maintenance of old buildings requires the installation of new or non-standard parts, challenging the problem solving and basic skills abilities of maintenance workers. Geographic areas where workers are hired with limited English ability, face special requirements. Such workers are limited in the tasks that can be delegated to them and in their ability to communicate with residents and other workers. In addition, supervisors must develop "creative" approaches to communicating with these workers, such as drawing pictures. Obviously, productivity of both the workers and supervisors are affected.

C. Management company policies and procedures differ considerably and affect literacy demands. For example, the authority to purchase materials and the responsibility for inventory control and preventive maintenance varied between the two firms. Some company documents and manuals were written in a confusing manner. Also, training practices increase literacy demands due to the required reading of technical material. The level of literacy of the maintenance supervisor/superintendent and the expectations of rental office personnel is very important. Relationships between maintenance and rental office personnel appeared strained at most sites and seem to affect the motivation and level of productivity of maintenance supervisors and their workers.

D. Low basic skills reduces productivity according to the workers and supervisors interviewed. Costs are increased. So are safety risks to workers and residents, particularly with respect to chemical usage and electrical repairs. Lack of basic skills leaves residents dissatisfied with the quality of work, time involved, and overall communication. It also has a serious impact on workers abilities to implement cost-saving programs such as preventative maintenance and inventory control due to the inability to handle the associated documents and paperwork.

E. Finally, the initial attempt to develop a prototype NAEP crosswalk met with limited success. While a structure was developed and tested, it was difficult to apply and inter-rater reliability was not established. At this nascent stage, the process is complex and time consuming. While the NAEP taxonomy appears to be relevant for analyzing workplace literacy tasks, the process of scaling of workplace tasks will require a great deal more work.

The major conclusions of the study are:

1. Productivity and job advancement in the building-maintenance "industry" are impeded by a lack of workplace literacy or competencies.

2. The workplace competencies needed include:

   a. **Communication skills** -- including English as a Second Language -- required to follow and give instructions, communicate with residents, negotiate with contractors, and interact with rental agents and building managers.

   b. **Document literacy** regarding work-orders, blueprints, meters/gages, labels, and charts.

   c. **Prose literacy** regarding instructions, contractor proposals, safety instructions, company policy, and union communications.

   d. **Quantitative literacy** regarding time and material budgets, measurement of quantity and spatial dimensions, and basic probability as it affects safety and preventative maintenance.

   e. **Problem-solving abilities** for tasks that require a combination of reading, writing, computation, and visualization skills and the integration of information from a number of different sources. Examples include completing the paperwork to request bids from outside contractors, reading schematics and charts to maintain heating and air conditioning units, and reading labels and Materials Safety Data Sheets in the use of chemicals.

   g. **Higher-order thinking skills** for functions such as inventory control, preventive maintenance, and evaluating proposals.

3. Maintenance workers will be resistant to learning "reading" or what are perceived as academic skills. Instead the learning will have to be imbedded in performing "hands on" practical work.

4. The value of enhancing maintenance workers' skills will depend on the organization's ability to use them. Supervisors, rental agents, managers, and general policy that have already adjusted to low literacy levels will have to change; otherwise the newly acquired skills will go unused.

5. A means of enhancing the literacy levels of maintenance workers is likely to have wide applicability for persons with a "hands on, schooling is not for me" mind-set.

The job tasks analyzed as part of this study could form the framework for a curriculum for maintenance skills. The range extends from simple job tasks to those that are very complex and needed for advancement. Such a curriculum might be helpful to a substantial fraction of the ten million workers in the maintenance, construction and related occupations.

The newly created Secretary's Commission on Acquiring Necessary Skills (SCANS) could use the results of this study and other literacy audits to carry out its mandate. For example, this study suggests that multiple choice tests of abstract skills are inadequate to assess basic literacy for maintenance jobs. Instead, simulations of realistic tasks will have to be made.

DATA COLLECTION

On July 1, 1989, Interactive Training Incorporated (ITI) initiated an 18 month national literacy audit funded by the Department of Labor (DOL). The major purpose of the audit was to determine the literacy requirements of maintenance workers/supervisors who work in multi-family housing building and projects.

ITI personnel met with the DOL project staff to define project goals and schedule. It was agreed that the project would use three methods of data collection -- mail information sheets, on-site interviews, and telephone interviews. The study would be conducted in cooperation with the Glick Corporation, a national property management firm having 120 rental properties in 12 states: Florida, Georgia, Kentucky, South Carolina, Virginia, Pennsylvania, New York, Ohio, Indiana, Michigan, Minnesota, and Illinois.

Dr Patricia Gold would serve as the Project Director and Ms. Barbara Gunn as the key Glick contact. Mark Kibbe, Training Director of the Glick Corporation and Bill Sickle, Instructor of the Home Builder's Institute would serve as industry-oriented subject matter experts (SMEs). Dr. Larry Mikulecky would serve as consultant on matters of data collection and analysis and Rad Drew & Associates would conduct the field work.

Dr. Gold made a presentation to Glick managers regarding proposed procedures, schedule, and the roles and responsibilities of the Advisory Panel. She also visited a Glick apartment complex in Indianapolis with Mark Kibbe to collect initial job materials, to get a firsthand view of a maintenance site, and to interview a maintenance supervisor.

A. BACKGROUND

The literacy literature and consultation with major experts (Dr. Thomas Sticht and Dr. Larry Mikulecky) indicated that the most challenging aspect of the study would be analyzing the underlying information processes and related literacy demands. Currently, this work is being conducted by the Educational Testing Service (ETS) in its National Assessment of Educational Progress (NAEP) and by Mikulecky and Drew in their workplace literacy audits. This research differs from earlier studies that gauged literacy based on readability formulas, amount of time spent on literacy activities, and narrow analyses of discrete reading skills.

The NAEP. The goal of the NAEP was to sample target population (21-25 year old young adults in the USA) so that reliable estimates of literacy proficiency could be obtained. The primary emphasis was placed on literacy behaviors frequently encountered in occupational, social, and educational settings. Twelve categories of materials were identified including signs/label, directions, memo/letter, form, table, graph, prose, index/reference, notice schematic/diagram, advertisements, and bill/invoice. These categories were crossed with five categories of use: knowledge, evaluation, specific information, social interaction, and application. Use or purpose is important since it refers to why individuals might engage in a task and indicates the type of information they need or are seeking. Some 105 tasks were developed and selected for inclusion in the assessment. A spiraling design was developed so that subjects took randomly equivalent sub-samples of the total sample.

Using this design, ETS measured the literacy skills of 3700 Americans ages 21-25 and was able to gauge their proficiency on three types of literacy tasks: prose, document, and quantitative. This laid the groundwork for identifying the processes underlying the literacy tasks.

Workplace Literacy Audits. In his early work, Mikulecky focused on observing and analyzing the nature of reading and writing at work in terms of amount of time spent and the type of materials involved. More recent work, however, emphasized specific underlying information processes involved in workplace literacy in a variety of job clusters. Based on numerous workplace literacy audits, Mikulecky and Drew developed procedures as follows:

- Choose initial tasks based on criticality, promotion and retraining requirements, and frequent mistakes.
- Select and schedule site visits well in advance to orient personnel and structure the visit so as to maximize data collection.
- Schedule interview and observation time to include 60-90 minutes per worker interview/observation and 60 minutes per supervisor interview.
- Audio/videotape worker observation as appropriate.
- Photocopy job materials.
- Analyze on-the-job reading literacy tasks for underlying information processes. This entails listing all of the elements of the task.

The information processing analysis is the most complex and time consuming aspect of the literacy audit. Research currently underway indicates that the literacy demands of a prescription label, for example, involve as many as 49 underlying information processes. Moreover, there is no accepted taxonomy for conducting the analyses. Indeed, determining the taxonomy and analyses are the most demanding aspects of the audit.

A logical next step was to apply the NAEP taxonomy to results of a workplace audit to determine its applicability to actual workplace literacy tasks.

B. INITIAL DATA COLLECTION

Analysis of initial site visit data from one Glick site and consultations with SMEs revealed that readability formulas (even those developed for workplace materials) could not be applied readily. Maintenance worker job materials do not provide the minimum number of words to sample.

Instead, job materials and their use would be analyzed using literacy task analysis procedures developed by Mikulecky and Drew. These procedures involve identifying the steps of selected job tasks and the related literacy elements of each step. The results of such analyses would be useful in the effort to apply the NAEP principles to actual job tasks and materials. The final outcome would provide initial evidence as to whether NAEP scales apply to workplace literacy.

In addition, initial information about maintenance workers' schedules revealed that random visits and observations would not be fruitful since so little of their time is spent engaged in literacy activities. Half of their time is spent cleaning various facilities and they are taught basic job tasks on the job by the supervisor or another worker. Therefore, it was decided that data would be collected from interviews and questions about job tasks rather than from random observations. It was decided that two-hour interviews with maintenance workers followed by one to two hour interviews with the maintenance supervisors would be ideal.

Data from the pilot visit to a Glick site and warehouse revealed that maintenance workers use a variety of job materials ranging from cleaning agents to hot water heaters to complete job tasks. The specific job tasks and related materials to be analyzed would be identified as part of the mail information data collection process. This determination was in keeping with the guidelines of Mikulecky and Drew in their methodology for identifying and selecting the actual job tasks and related materials to be included in a literacy audit.

C. PRELIMINARY DESIGN

ITI worked with SMEs to design the overall study and study protocols. As shown in Figure 1, the study was designed to provide information from:

- mail collection of data from maintenance supervisors
- on-site interviews with maintenance workers and supervisors at local (Indianapolis) sites and remote sites
- telephone interviews with maintenance workers at remote sites.

We anticipated the documentation of literacy requirements of 20 maintenance worker tasks.

The study was designed to answer five major questions:

- What literacy demands are required of maintenance workers to perform successfully on the job and lead to promotion?

- What are the effects of geographic location on literacy demands?

- What are the effects of management company policies and procedures on literacy demands?

- What impact might the lack of literacy have on workers, residents, and the industry in general?

- Can the NAEP taxonomy and scales be used to analyze actual workplace tasks and materials?

DATA COLLECTION:	SUPERVISOR INFORMATION (Mid-Jan/Late-Feb)	SITE VISITS (March-June)	TELEPHONE INTERVIEWS (August)
NO. OF PARTICIPANTS:	100 Supervisors by mail	20 Workers/10-20 Tasks 12 at 6 Local Sites 8 at 4 Remote Sites	12 Workers/10 Tasks Remote Sites
PURPOSE/OUTCOME:	Identification of 10-20 tasks for study Identification of local and remote sites	Description of literacy requirements of tasks	Identification of regional/management differences
PROCESS:	Supervisors rate tasks on basic skills, safety, and productivity	Field team interviews worker for 1-2 hrs about 2-3 selected tasks	Caller interviews worker for 1-2 hrs about 2-3 selected tasks
DATA ANALYSIS:	Quantitative Frequency/average of responses Descriptive Summary of open-ended responses	Descriptive Information processing analysis of 10 tasks	Descriptive Summary of responses

FIGURE 1

MAINTENANCE TECHNICIAN LITERACY PROJECT DESIGN OVERVIEW

D. IDENTIFICATION OF JOB TASKS TO BE STUDIED

The first step was to select from the most important maintenance workers' tasks. Using the Home Builders Institute 11-page outline of typical maintenance worker tasks, ITI had SMES rate several hundred tasks on five factors: 1) frequency, 2) importance, 3) danger, 4) likelihood of change, and 5) necessity for listening, speaking, reading, writing, math, and problem solving (see Appendix A). Analysis of the responses allowed for the identification of 60 tasks deemed to be high in frequency, importance, danger, and requiring basic skills. None of the tasks requiring basic skills were identified as likely to change significantly in the future, therefore that factor was eliminated from the study. The 60 tasks were formatted for the supervisor mail information sheets in preparation for review by the Advisory Panel.

E. ADVISORY PANEL

To ensure a national broad industry-based perspective and support of the project ITI established an advisory panel. The panel included the following representatives of national organizations and associations:

- Mr. Chuck Achilles, Staff Vice President,
  Institute of Real Estate Management

- Ms. Elaine Kite, Director of Publicity
  National Apartment Association

- Ms. Brenda McClain, Director of Education
  NHP Property Management, Inc.
  Representing National Association of Home Builders, Chair, RAM Board of Governors

- Dr. Larry Mikulecky, Learning Skills Center
  Indiana University

- Mr. J.D. Miller, Indiana Department of Employment and Training Services

- Mr. Jeffrey Tillet, Maintenance Supervisor,
  Glick Corporation

- Mr. C.J. Tirone, Director of Programs, Job Corps
  Home Builders Institute

- Ms. Chris Wolfe, Training Director
  Glick Corporation

Advisory Panel Meeting. The Advisory Panel convened on January 9, 1989 at the Glick Headquarters in Indianapolis. In addition to the advisory panel members, the following people were in attendance:

- Mr. William Delaney, Contracting Officer
  U.S. Department of Labor

- Dr. Patricia Gold, Vice President
  Interactive Training Incorporated (ITI)

- Ms. Barbara Gunn, Executive Director
  Eugene and Marilyn Glick Foundation

- Mr. Frank Basille, Vice President, Property Maintenance
  Glick Corporation

- Ms. Deana Williams, Division Manager, Glick Corporation

Panel members gave their reactions to the study design and protocols and made some specific suggestions as to categories on the Information Sheets that should be added and revised.

A national perspective required including properties in regions of the country other than those represented by the Glick Corporation. Brenda McClain offered to include properties from her company (NHP) to round out the study. Information Sheets would be mailed to all Glick properties as planned, followed by a targeted mailing to NHP properties in different regions of the country. The goal was to include information from all regions of the country as outlined on the map in Appendix B:

- Northeast/Mid Atlantic (DOL regions 1-3)
- South/Southwest (DOL regions 4 & 6)
- North/Central (DOL region 5)
- West/Northwest (DOL regions 8-10).

F. MAIL INFORMATION SHEETS

The Information Sheets, mailed in February 1989, were used to identify the job tasks to study and to select the most appropriate sites for conducting the study. Use of the Mail Information Sheets involved:

- data collection from 82 Glick and 50 NHP maintenance supervisors
- data analysis identifying job tasks to study
- data analysis to identify 6 local sites and 4 remote sites.

The supervisor mail survey listed 60 tasks performed by maintenance technicians (See Appendix B, Supervisor/Superintendent Mail Survey). Supervisors rated each task on a scale of 1-3 for basic skills, safety, and frequency. Open-ended questions provided a different format for eliciting information about tasks related to safety, productivity, and promotability. Participation was sought for the study's subsequent site visits and telephone interviews. (Supervisors and superintendents are interchangeable titles.)

Glick Properties. Information Sheets were mailed to all Glick division directors, property managers, and 82 maintenance superintendents. A regional analysis of the Glick returns showed that the North/Central area was most heavily represented, with some representation in the Northeast/Mid Atlantic and South/Southwest areas; there was no representation in the West/Northwest area.

NHP Properties. Working with Brenda McClain, ITI selected NHP properties in under-represented and non-represented regions for inclusion in the study. Information Sheets were mailed to 50 NHP maintenance superintendents for inclusion in the data collection process.

G. SITE VISITS

Six local visits were conducted at Glick properties in the Indianapolis area between March and June 1989. The time span for data collection was lengthened so as to capture data on seasonal tasks such as maintaining heating, air conditioning, pools, and grounds.

A typical site visit included interviewing the supervisor and maintenance worker individually using questions as shown in Figure 2, observing the simulation of job tasks, and collecting job materials. The number of tasks noted and analyzed varied at each site, ranging from one multi-step process to five discrete tasks. Each site visit required approximately three hours.

Four site visits were conducted in May at NHP properties, two in New York City and one each in Dallas and Irving, Texas. The sites were chosen to explore possible regional differences such as urban versus suburban setting, high rise versus garden structure, and warm versus cooler climate. In addition, differences due to property management firms and subsidized versus non-subsidized housing were noted.

H. TELEPHONE INTERVIEWS

In order to ensure that data collected from the original questionnaires and site visits were valid and accurate, additional information was collected via telephone interviews from supervisors not included in site visits. A total of 13 interviews were conducted with six Glick and seven NHP maintenance supervisors across the four geographic regions as follows:

- 3 Northeast/Mid-Atlantic (1 Glick; 2 NHP)
- 3 South/Southwest (2 Glick; 1 NHP)
- 4 North/Central (3 Glick; 1 NHP)
- 3 West/Northwest (3 NHP)

The telephone protocol (see Appendix C) included some of the same questions from the original questionnaire. Respondents were questioned about information observed during visits to other sites. Thirteen telephone interviews were made. Each interview required several hours each. It soon became apparent that much of the information was repetitive, i.e. answers were similar and were validating much of the information already collected.

Sample Interview Questions

BACKGROUND

What is your title and job description?
How long have you been in this job?
How did you learn this job?
What special training did you have for this job?
How important is reading, writing and math to the successful completion of your job?
What do you find is the most challenging part of your job?
What is the most important part of your job?
What could go wrong if you didn't do this part of your job correctly?

LITERACY TASKS

Will you please show me the books, manuals, forms or charts you read in order to do your job?
Which of these is hardest to read?
How often do you use this manual (chart, form, etc.) in doing your job?
If you were training a new person to do this part of your job, what would he have to know before you could teach him/her?
What would a new person find most challenging about learning your job?
What reports, memos, summaries or other written messages do you read or write in your job?
What math or science skills do you use in your job?
What technical equipment do you use in your job?
What special measuring tools do you need to read to do your job?
What computer equipment (or computerized machines and tools) do you use in your job?

TRAINING AND PROMOTABILITY

In which parts of your job would you like to improve?
What skills would you need to learn in order to be promoted to a different or better job?
Are you currently being trained (or are you training someone new) to do this job?
What is most difficult about the training you are in now?
How has your job changed since you first started it?
Do you expect to be going back to school or training in this or another job?
Will you please show me the training manuals and exercises which are most difficult for you?

PROBLEM SOLVING (METACOGNITION)

Explain what information you are looking for when you read this manual (form, chart, etc.)
Tell me, step by step, how you get information from this manual (etc.).
Tell me, step by step, how you got the information when you were new on the job.
Show me how you know....
Explain in detail...
How did you know to do that?
How did you learn that part of your job?
What do you do first, second, third, etc.
What do you do if you don't find what you are looking for the first time?
Where else could you go for this information?

FIGURE 2

*From Drew R. & Mikulecky, L., How to Gather and Develop Job Specific Literacy Materials for Basic Skills Instruction. Indiana University Bloomington, IN, 1988.

ADMINISTRATIVE

Will you please show me the general safety material you read in your job?
Will you tell me how you read:

- your insurance manual
- your time card or check stub
- your income tax withholding forms
- company policy manuals
- union literature
- company news bulletins

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DATA ANALYSIS

A. MAIL INFORMATION SHEETS

Figure 3 shows the final regional/company breakdown of the Mail Information Sheet data collected. The return rate was 56 (70%) and 26 (52%) for Glick and NHP supervisors, respectively. The 82 completed Mail Information Sheets were analyzed to choose the tasks to study and the sites to visit. Tasks were chosen from page three of the Information Sheets (Appendix B) where superintendents were asked to list the jobs that most frequently require reading or math and:

- can be dangerous if done wrong
- can take a lot of money and time to redo if done wrong
- you need to do well to be promoted.

The most common tasks listed are shown in Table 1 along with the number and percentage of response. An overwhelming number of superintendents were concerned about literacy related to:

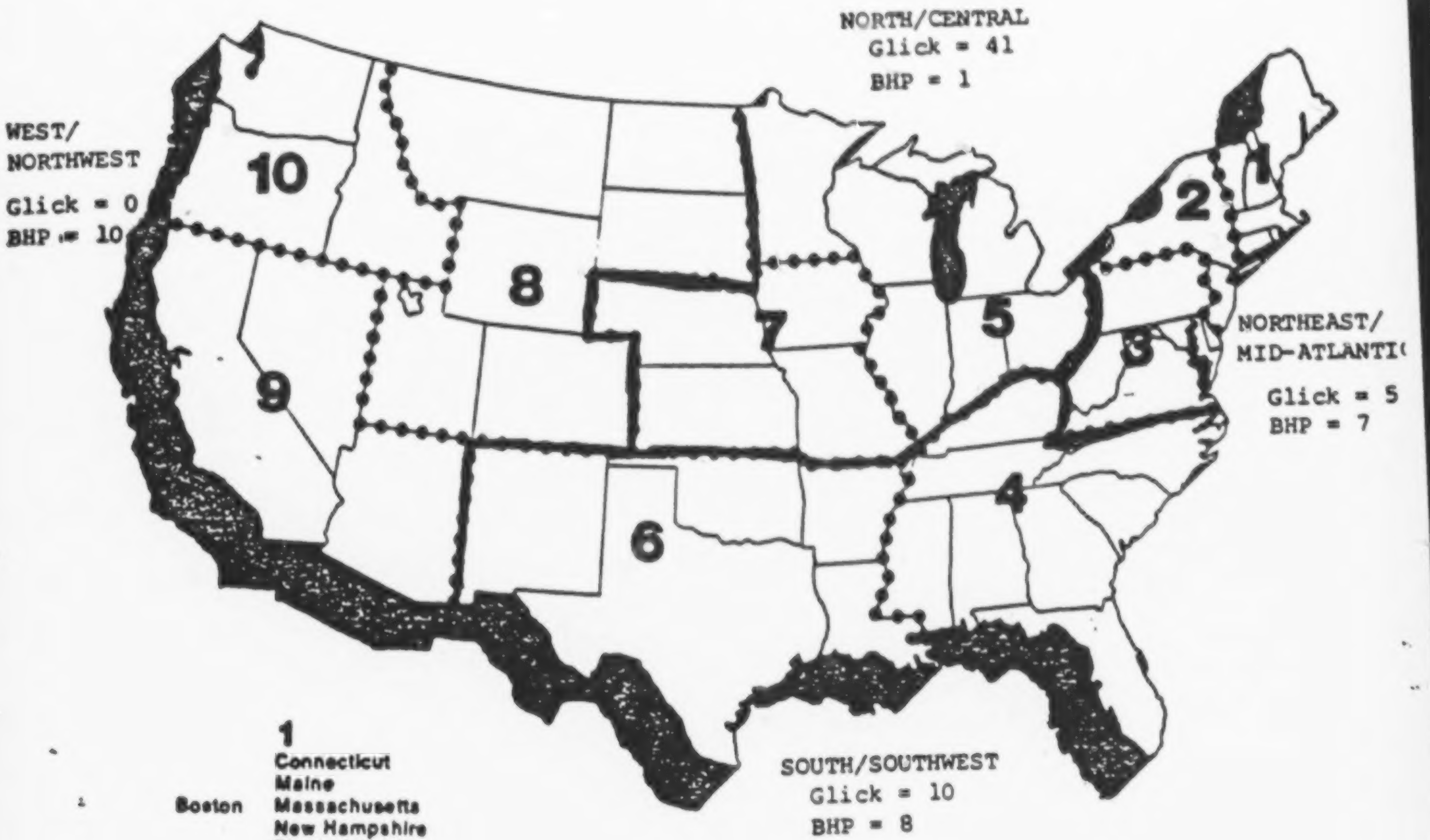
- maintaining heating and air conditioning units (51 or 62%)
- handling chemicals (46 or 56%)
- making electrical repairs (56 or 71%).

In addition, returns showed that promotion was related to the ability to:

- maintain budgets (27 or 33%)
- make bids on jobs according to specifications (which requires reading blueprints and schematics) (26 or 32%)
- handle paperwork (18 or 22%).

It was determined that site visits would focus on an analysis of tasks related to the above areas.

U.S. Department of Labor Regions and Regional Office Cities


NORTH/CENTRAL
Glick = 41
BHP = 1
WEST/
NORTHWEST
Glick = 0
BHP = 10
NORTHEAST/
MID-ATLANTI
Glick = 5
BHP = 7
SOUTH/SOUTHWEST
Glick = 10
BHP = 8
1
2
3
4
5
6
7
8
9
10

1
Boston
Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

2
New York
New Jersey
New York
Puerto Rico
Virgin Islands

3
Philadelphia
Delaware
District of Columbia
Maryland
Pennsylvania
Virginia
W. Virginia

4
Atlanta
Alabama
Florida
Georgia
Kentucky
Mississippi
N. Carolina
S. Carolina
Tennessee

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Denver
Colorado
Montana
N. Dakota
S. Dakota
Utah
Wyoming

9
San Francisco
Arizona
California
Guam
Hawaii
Nevada

10
Seattle
Alaska
Idaho
Oregon
Washington

FIGURE 3

RESPONSE BY COMPANY AND REGION

NORTHEAST/MID-ATLANTIC SOUTH/SOUTHWEST NORTH/CENTRAL WEST/NORTHWEST ALL

	N. EAST/MID-ATLAN: REGIONS 1-3		TOT REG	SOUTH/SOUTHWEST: REGIONS 4 & 6		TOT REG	NORTH/CENTRAL REGIONS 5 & 7		TOT REG	*WEST/N.WEST: REGION 8-10		TOTAL REGIONS
MOST FREQUENT COMMENTS	GLK N= 5	BHP N= 7	TOT	GLK N=10	BHP N= 8	TOT	GLK N=41	BHP N= 1	TOT	*BHP N= 10	TOT	TOTAL N=82
1.USE/MEASURE/STORE CHEMICALS	0 0%	4 57%	5%	6 60%	7 88%	38%	22 54%	1 100%	55%	6	60%	56%
2.REPAIR ELEC./CIR.BRKR/WIRING	4 80%	4 57%	38%	8 80%	5 63%	68%	29 71%	1 100%	71%	7	70%	71%
3.MAINTAIN HEATING/AC/FURNACE	2 40%	4 57%	21%	4 40%	6 75%	26%	29 71%	1 100%	71%	5	50%	62%
4.INSTALL MAJOR APPL/HOT WTER HTR	1 20%	4 57%	13%	0 0%	1 13%	1%	3 7%	1 100%	10%	4	40%	17%
5.REPAIR PLUMBING	1 20%	3 43%	12%	3 30%	2 25%	18%	9 22%	1 100%	24%	2	20%	26%
6.INSTALL DOORS/GLASS/MEASURE	1 20%	0 0%	8%	0 0%	0 0%	0%	8 20%	1 100%	21%	2	20%	15%
7.MAIN.FIRE/SAFETY/SECURITY/ALARM	1 20%	0 0%	8%	0 0%	0 0%	0%	5 12%	0 0%	12%	0	0%	7%
8.MAINTAIN BUDGET	1 20%	6 86%	15%	6 60%	0 0%	33%	11 27%	0 0%	26%	3	30%	33%
9.MAINTAIN INVENTORY	0 0%	1 14%	1%	1 10%	0 0%	6%	4 10%	0 0%	10%	1	10%	9%
10.ORDER SUPPLIES	1 20%	1 14%	10%	1 10%	0 0%	6%	7 17%	0 0%	17%	1	10%	13%
11.FOLLOW SCHED/ORDERS/PRIORITIZE	0 0%	1 14%	1%	1 10%	1 13%	6%	3 7%	0 0%	7%	3	30%	11%
12.DEVELOP SCHEDULES	2 40%	3 43%	20%	3 30%	0 0%	17%	3 7%	0 0%	7%	0	0%	13%
13.CONDUCT INSPECTIONS	0 0%	0 0%	0%	0 0%	0 0%	0%	3 7%	0 0%	7%	1	[illegible]	5%
14.SUPERVISE/TEACH WORKERS	0 0%	0 0%	0%	0 0%	2 25%	1%	1 2%	0 0%	2%	2	20%	6%
15.HANDLE PAPRWK/MANUALS/POLICIES	1 20%	1 14%	10%	1 10%	1 13%	6%	11 27%	0 0%	26%	3	30%	22%
16.MAKE BIDS/JOB SPECS/BLUEPRINTS	1 20%	4 57%	13%	4 40%	1 13%	23%	15 37%	0 0%	36%	1	10%	32%
17.COMMUNICATE W/WORKERS/RESIDENT	0 0%	0 0%	0%	0 0%	2 25%	1%	3 7%	0 0%	7%	1	10%	7%

*GLICK HAS NO PROPERTIES IN THIS REGION

TABLE 1

DATA ANALYSIS—NUMBER AND PERCENTAGE OF RESPONSES PER COMPANY AND REGION

B. SITE VISITS

In order to make the most effective use of the field team, six site visits were made locally to Glick properties in the Indianapolis area. The sites were selected based on willingness to participate, number of workers that could be interviewed at each site, and location. An overwhelming majority of respondents expressed a willingness to participate in the study, both by actual site visit and telephone, thus site selection was not a problem.

It was decided, that the two remote visits would be scheduled for NHP properties in New York and Texas to collect data on urban and southwestern sites. Remote visits were scheduled to capitalize on the seasonal differences in the use of chemicals (in pools and ground maintenance) and in the maintenance of air conditioning units. Site visit information is summarized in Appendix D.

At some sites, the maintenance supervisors exhibited low levels of literacy. At others, the supervisors were more literate and encouraged higher literacy and productivity among the maintenance workers, specifically:

- at two sites where superintendents had low levels of literacy, there was little emphasis on literacy skills of the maintenance supervisor and workers (in one case the rental manager handled much of the supervisor's work)
- at two sites where the superintendents had moderate levels of literacy there was moderate emphasis on literacy in performance of job tasks by maintenance workers
- at two sites where the superintendents had high levels of literacy there was high emphasis on literacy skills in performance of job tasks by maintenance workers.

The amount of reading on the job depends on the literacy of the maintenance supervisor. The supervisor's level of literacy seemed determines the level of literacy needed and used by the maintenance workers.

Initial information indicated that maintenance workers use minimal literacy skills in completing tasks on the job. While new on the job, they are highly supervised and, when in doubt, ask co-workers or the supervisor for information. This suggests that there is a general lack of productivity among supervisors having new workers due to the high degree of supervision needed and that, left unsupervised, many potential safety problems may exist among new workers. These initial findings further indicated the need to focus on the tasks initially identified, both to prevent accidents and increase productivity. Therefore, the field team focused on those tasks, but spent more time with maintenance supervisors than had been originally anticipated.

Notation of Other Observations. Miscellaneous observations noted during the site visits were recorded in the form of anecdotal records as shown in Appendix D. Again the variability of skill level among maintenance supervisors was noted. Some supervisors use high levels of literacy and encourage it among their maintenance workers, whereas others seem to lack basic literacy skills themselves. However, a general lack of literacy skills seems pervasive:

- At site 1, the maintenance assistant uses the radio to estimate the amount of time to complete a task, rather than using a watch.

- At site 2, the maintenance supervisor misread forms and talked about using "common sense" rather than literacy skills.

- At site 3, the maintenance assistant, in using a blueprint revealed his inability to use the legend key.

- At site 4, slow "typing" slowed the maintenance superintendent's productivity in working with documents.

- At site 5, the maintenance supervisor reported a small accidental explosion caused by the misuse of an insecticide.

Analysis of Job Materials. In addition to interviews and observations, site visits resulted in the collection of various job materials including labels, forms, maps, blueprints, and documents of all kinds. Job materials related to twelve specific job tasks were analyzed to identify the underlying information processes (see Appendix E). These ranged from relatively simple on-step tasks such as informing residents about service performed on their apartment to complex multi-step tasks such as executing a competitive bid process.

A brief summary of the findings indicates that:

- Even the simplest job task, such as completing a maintenance door tag, requires three major processes and a subset of those processes. These include scanning and locating information, combining simple addition and subtraction operations, assigning priorities to tasks, and being able to formulate appropriate questions.

- Document literacy is widely used. It is almost always integrated with quantitative and/or prose literacy. Document literacy involves locating and matching information, hypothesizing causes of problems and possible solutions, summarizing information, and possibly estimating costs of time and materials. Document literacy might also integrate the use of schematics, such as maps, charts, and diagrams to locate specific rental units, diagnostic procedures, and parts repair/replacement information. The amount of writing required to complete documents varies greatly--from checking off information and writing short words or phrases to writing longer sentences and descriptions.

- Most of the job tasks require the ability to ask the right questions in order to solve problems. Nearly every job task analyzed in this study requires the ability to ask questions, formulate answers, and make judgments about the subsequent course of action. This particular ability significantly impacts issues of productivity, cost, and safety.

- Job tasks frequently require integrating information from multiple references and documents. Manuals, catalogs, maps, diagrams, and charts are used in concert when executing the maintenance and repair of rental units.

C. TELEPHONE INTERVIEWS

Responses from telephone interviews with supervisors were documented as shown in Appendix C. Table 2 shows the major aspects of the interviews that were analyzed: 1) self reports of reading frequency of map-like materials (Part VI), labels (Part IV), and instructions (Part VI), and rating of critical areas requiring basic skills (Part X). In addition, responses to the distribution of work tasks (Part IX) are described below.

Self Report of Reading Frequency. As shown in Table 2, maintenance supervisors reported reading frequency as follows:

- Map-like materials, particularly, blueprints, were most often used--9 (69%) of the respondents use them frequently, whereas 3 (23%) seldom use them, and 1 (8%) do not use them at all.

- Labels were always or often read by 8 (61%) of respondents, whereas 5 (39%) seldom read the label or only read it on the first use.

- Instructions were used least often--4 (30%) indicated that they use them frequently, 6 (47%) use them only at first or rarely, and 3 (23%) do not use them at all.

Critical Areas. Maintenance workers responded to the question about the three most important materials maintenance workers need to read, write and compute as shown in the right column of Table 2. The results show the greatest need for reading (69%), writing (100%) and computing (77%) pertaining to documents and forms. These include daily work orders, service requests, in/out inspections forms, purchase orders, and competitive bid forms. Computation skills entail measuring as well as basic mathematical operations.

Reading chemical labels (30%) and measuring accurate amounts of chemicals (46%) were seen as less important. Using references/resources, charts, meters and gauges, map-like materials and memos/bulletin boards were also seen as less important. Basic skills pertaining to instructions/directions, identification numbers, and signs were not seen as being important at all.

It is interesting to note the discrepancies between the self reported reading frequencies and ratings of critical areas:

- While most supervisors reported using map-like materials often, few listed them as critical areas requiring basic skills.

- Similarly, more supervisors reported reading labels than perceiving labels as being critical pertaining to basic skills.

- The most striking discrepancy occurs with instructions/directions. A third of respondents reported using them often, yet none perceived them as critical in requiring basic skills.

These findings suggest that supervisors may do most of the reading for the worker, creating a centralized reading environment where workers have to do little reading. Thus, they do more reading than they perceive their workers do. They are the purveyors of information, as discussed in the next section.

Distribution of Work Tasks. Maintenance supervisors were asked if there were any tasks that they perform themselves that they would like their maintenance workers to perform and if the level of their maintenance workers' basic skills prevent them from assigning them those tasks. The responses were analyzed on three levels:

- 10 (77%) indicated that there are tasks that they would like to assign their maintenance workers.

- Basic literacy skills are required for many of the tasks mentioned including reading work orders; completing general paperwork, expense reports, budgets and payroll; and reading time clocks, valves, gauges, and repair instructions.

- Only 2 (15%) of the respondents indicated that low levels of literacy prevent them from assigning these tasks. Both of these cases pertained to workers who had limited English (ESL) skills. This finding would appear to indicate that the respondents do not perceive a lack of basic skills to be a problem or that they were reticent to divulge a perceived lack of basic skills to the interviewer.

The results lead to some interesting questions as to why maintenance supervisors do not delegate more tasks if their workers are capable of doing them. Perhaps it is their way of maintaining control, or they are unwilling to admit that their workers have low literacy skills, or they are not sensitive to their literacy levels. Speculations about this question are discussed in the next section.

MATERIAL TYPE	SELF REPORT OF READING FREQUENCY			RATING OF CRITICAL AREAS REQUIRING BASIC SKILLS		
	OFTEN	SELDOM	NEVER	READING	WRITING	COMPUTATION
1. MAP-LIKE MATERIALS (e.g. blueprints, schematics, maps, floor plans)	69%	23%	8%	15%	0%	15%
2. FORMS/DOCUMENTS (e.g., daily work orders, checklists, purchase orders, competive bid forms)	N/A	N/A	N/A	69%	100%	77%
3. LABELS (e.g., MSDS, cleaning solvents, pool chemicals)	61%	39%	0%	30%	0%	66%
4. REFERENCES/RESOURCES (e.g., parts catalogs, manuals, specifications)	N/A	N/A	N/A	30%	8%	0%
5. CHART-ORIENTED (e.g., price lists, AC pressure charts)	N/A	N/A	N/A	30%	0%	0%
6. INSTRUCTIONS/DIRECTIONS (e.g., installation, application, assembly)	30%	47%	23%	0%	0%	0%
7. METER/GAUGES (e.g., electrical, thermometers, rules)	N/A	N/A	N/A	0%	0%	23%
8. IDENTIFICATION NUMBERS (e.g., equipment, appliance replacement parts, model numbers)	N/A	N/A	N/A	0%	0%	0%
9. MEMOS/BULLETIN BOARDS (e.g., notes, office memos company bulletins, notices)	N/A	N/A	N/A	8%	0%	0%
10. SIGNS (e.g., posted warnings, safety first aid, road signs, building names and numbers)	N/A	N/A	N/A	0%	0%	0%

TABLE 2

RESULTS OF TELEPHONE INTERVIEWS WITH MAINTENANCE SUPERVISORS
REGARDING MATERIALS REQUIRING BASIC SKILLS

FINDINGS AND DISCUSSION

A. LITERACY REQUIREMENTS OF MAINTENANCE WORKERS

The maintenance worker's environment is a print-rich one. There is a wide range of printed materials presented in a variety of formats. However, far more material is present than is actually used.

Printed materials present in the maintenance worker's environment include:

- map-like materials (e.g., blue prints, schematics, maps, floor plans)
- forms and documents (e.g., daily work orders, checklists, purchase orders, competitive bid forms)
- labels (e.g., Material Safety Data Sheets [MSDS], cleaning solvents, swimming pool chemicals)
- references and resources (e.g., parts catalogs, manuals, specifications)
- chart-/table-oriented materials (e.g., price lists, AC pressure charts)
- instructions and directions (e.g., installation instructions, application procedures, assembly instructions, etc.)
- meters and gauges (e.g., electrical meters, thermometers, freon gauges, pressure gauges, measuring devices [rules, measuring wheel, scales])

- identification numbers (e.g., equipment, appliance, and replacement part ID numbers; model numbers on equipment as well as on boxes in the stockroom or warehouse)

- memos/bulletin board communication (e.g., notes, office memos, union or company bulletins, notices)

- signs (e.g., posted warnings, safety, first aid procedures, road signs, building names, numbers, or letters).

Table 3 identifies each of these categories of reading materials and indicates the degree to which the materials were observed by the field team to be present in the work environment (high=5, med=3, low=1); the degree to which these materials are actually used by workers (high=5, med=3, low=1); how critical the reading of the material is to the completion of the task (high=5, med=3, low=1); and, finally, whether the printed material is essential to the completion of the task (integrated=5), supports the completion of the task (supportive=3), or is not necessary to the completion of the task (incidental=1). Since each category includes a wide variety of specific materials, the descriptions provided in the table are generalizations. Specific materials or tasks within a particular category may be rated differently from the category analyzed as a whole. These rankings made by the field team were based on ten site visits and quantified as part of the data analysis procedure.

Based on the four factors in Table 3, the material types can be ranked as follows:

- Forms/documents, rated high on all factors, ranks most important with 20 points.

MATERIAL TYPE	PRESENCE	FREQUENCY	CRITICAL	NEED**	TOTAL	FINAL RANKING	CRITICAL VS. FREQUENCY
1. MAP-LIKE MATERIALS (e.g. blueprints, schematics, maps, floor plans)	5	3	3	3	14	2	0
2. FORMS/DOCUMENTS (e.g., daily work orders, checklists, purchase orders, competive bid forms)	5	5	5	5	20	1	0
3. LABELS (e.g., MSDS, cleaning solvents, pool chemicals)	5	1	5	2	13	3	4
4. REFERENCES/RESOURCES (e.g., parts catalogs, manuals, specifications)	3	1	3	4	11	5	2
5. CHART-ORIENTED (e.g., price lists, AC pressure charts)	1	1	5	5	12	4	4
6. INSTRUCTIONS/DIRECTIONS (e.g., installation, application, assembly)	3	1	3	2	9	6	2
7. METERS/GAUGES (e.g., electrical, thermometers, rules)	3	1	5	5	14	2	4
8. IDENTIFICATION NUMBERS (e.g., equipment, appliance replacement parts, model numbers)	5	3	3	2	13	3	0
9. MEMOS/BULLETIN BOARDS (e.g., notes, office memos company bulletins, notices)	3	1	1	1	6	7	0
10. SIGNS (e.g., posted warnings, safety first aid, road signs, building names and numbers)	3	1	1	2	7	8	0

*LEGEND: 5=HIGH 3=MEDIUM 1=LOW

**LEGEND: 5=INTEGRATED 3=SUPPORTIVE 1=INCIDENTAL

TABLE 3

OBSERVATIONS OF READING MATERIALS AVAILABLE VS. AMOUNT OF READING PERFORMANCE

- Map-like materials and meters/gauges rank next, each having 14 points. While map-like materials are present more frequently, meters/gauges are rated critical and integrated, and therefore may actually be more important than map-like materials.

- Labels and identification numbers each rank third. However, labels are rated critical to the completion of the task, yet rated low in the frequency with which workers read them.

- Chart oriented materials and references/resources are rated fourth and fifth, respectively. Charts are rated high in terms of need and criticality, yet low in terms of frequency.

- Memos/bulletin boards and signs are rated lowest--each being low in all categories.

Note the ratings of need and criticality versus actual frequency of reading by workers shown in the last column of Table 3. Large gaps are indicated in the areas of labels, chart-oriented materials, and meters/gauges; smaller gaps in the areas of references/resources and instructions/directions. The large gaps suggest subject areas needing greater literacy emphasis.

Relative Difficulty of Literacy Tasks. Based on the literacy analyses in Appendix E, the most difficult job tasks involving literacy skills are:

- the competitive bid process
- schematic reading
- AC freon pressure charts
- labeling and Materials Safety Data Sheets

The competitive bid process (which involves the solicitation and evaluation of bids from outside contractors) is almost always performed by the superintendent. Evaluating bids is very difficult because it involves multiple resources and requires interpretation of specifications written in sophisticated prose. The superintendent must then apply these specifications to the specific configurations of the apartment complex and use the information to make decisions by comparing vendors' bids to the specifications. He must then compare dollar amounts and determine which contractor offers the best deal, weighing such factors as each vendor's references, past involvement with the company, etc.

Schematic reading, performed to varying degrees by nearly all maintenance workers, is difficult because it requires the reader to visualize different views, interpret specialized symbols, and understand the concept of keys or legends. The wide variety of schematics and maps and the subtle differences between them adds to the complexity of reading and using them.

Reading AC freon charts to determine the correct pressure is done by superintendent and trained assistants. The task is very difficult because it involves combining several different types of reading, including thermometers, pressure gauges and three column charts, to solve a problem. The worker must successfully read several different gauges, match numbers on the chart, and then apply that information to identify and correct a problem.

Reading labels on chemical containers and Materials Safety Data Sheets is very difficult. Part of the problem is the complex language. Additionally, the format for labels varies greatly so that important information is found in different places on different labels. Workers are rarely encouraged by superintendents or peers to read safety or application information prior to use.

Many chemicals applications do not require a worker to read the label in order to do the actual application. However, failing to read may lead to improper or unsafe application. Finally, labeling is often difficult to read because information is cramped or provided in a confusing format.

Computational Tasks. Based on site observations and job material analysis, it appears that maintenance workers perform a range of computations including:

- addition
- subtraction
- multiplication
- division
- calculations combining two or more of the above (e.g., determining areas, finding percentages)
- counting
- measuring
- comparing numbers
- reading multiple-column numerical tables and charts

Addition is used frequently on the job. Examples of addition include calculating time on task and totaling time worked per day on the daily task sheet, and totaling dollar amounts on purchase orders and service orders.

Subtraction was applied very little and was used most at sites that implemented inventory control (New York) and a special type of corrective maintenance work order procedure (New York and Dallas).

Multiplication was required frequently at most sites. Applications included calculating areas of parking lots, converting yards to feet, applying ratios when mixing pool chemicals or cleaning solvents. At sites that implemented a corrective maintenance work order procedure multiplication was applied to calculate the percentage of materials used to do a job at each apartment. (For example, workers calculated the percentage of a tube of caulking compound used and computed the cost for the percentage used. The tenant was then billed for the exact amount of caulk used for the repair to his/her apartment.)

Division was applied less frequently and was used when calculating ratios for chemical applications (pool, cleaning, chill air conditioning) and for converting feet to yards.

Counting was frequently required, such as when noting the number of stripes that needed to be repainted in the parking lot, checking the number of parts in stock when reordering, checking blueprints for the number of replacement shrubs needed, checking blueprints for the number of items (doors, windows, light receptacles, etc.) needing repair or replacement.

Measuring was sometimes necessary using a variety of devices (meters, gauges, measuring cups, measuring wheel, carpenter's rule, tape measure,) for checking electrical capacities, pump pressures, mixing pool chemicals, measuring large, irregular areas, and taking measurements for replacement doors or windows. Workers were also required to read dimensions from blueprints and note dimensions of replacement parts such as half-inch faucet washers.

Comparing numbers was required to a high degree at all sites. Comparing was necessary when matching part numbers on boxes in the stock room, finding page numbers on blueprints, determining if a number is within a given range, and comparing bid amounts to determine if they are greater than or less than each other and a given budget amount.
Using multiple-column numerical tables occurs very infrequently. Only two tasks require the reading of numerical tables: AC freon pressure charts and the muriatic acid chart for determining how

much acid to add to pools with low pH.

Most computation involved in administrative tasks (purchase orders, service work orders, competitive bid procedures) is done exclusively by maintenance superintendents rather than maintenance assistants. Computation involved in maintenance tasks was often delegated to maintenance assistants, and usually involved the use of rules, tape measures, measuring cups and thermometers. Some sites avoided measurement altogether. However, measurement skills were required at older sites where buildings had settled. At sites where blueprints were not available, it was necessary to measure for all replacement doors, windows and fixtures. In newer complexes or complexes with complete and accurate blueprints, workers relied on the measurements noted on blueprints when placing orders for replacement items and measurement often was not necessary.

At sites that implemented inventory control procedures or preventative maintenance procedures (NYC and Dallas) where they calculated the percentage of materials used on a job, higher level math skills were required if workers were to implement the program correctly.

Other factors or conditions that increase the need for computation and higher level worker skills include:

- presence of swimming pool
- water-cooled AC rather than window units or modern central AC
- support from, and expectations of, superintendent
- formal training
- responsibility of maintenance department compared to rental office.

B. EFFECTS OF GEOGRAPHIC LOCATION

Maintenance workers in the industrial Northeast (New York City), the Sunbelt (Dallas area), and the Midwest (central Indiana), representing both inner city and suburban locations were interviewed. Geographic location does change job tasks. However, the differences stem from the different physical characteristics of complexes located in different areas (e.g., inner-city sites often have elevators and usually do not have swimming pools, Sunbelt sites usually have pools and air conditioning, Midwest sites usually have extensive grounds).

In some cases the geographic location affects the extent of maintenance (and consequently literacy) demands posed by certain features. For example, because of the climate, maintenance workers at sites located in the Sunbelt potentially face increased demands from grounds-keeping, pools and air conditioning.

Other factors associated with geographic area but not with the features of complexes also alter the need for literacy. For instance, all apartment maintenance workers in New York City are unionized. These workers potentially encounter extensive communications from the union, many of which are directly related to their jobs (e.g., notices about courses sponsored by the union). Also, the majority of entry-level apartment maintenance workers at the New York City and Dallas-area sites we visited are Spanish-speaking and have poor English language skills. These workers often find it very difficult to cope with the components of their jobs requiring literacy skills. Their supervisors often find creative ways to communicate with them (if the supervisor does not speak Spanish) or to limit the literacy demands posed by their jobs (e.g., premixing cleaning chemicals).

Environmental factors also can affect the maintenance and related literacy demands confronting workers. Because of the climate, workers in the Sunbelt need to maintain pools and air conditioning units. Workers in the Midwest and Northeast face greater demands concerning snow removal. Workers in the inner city face relatively greater maintenance and repair demands due to more frequent vandalism.

Reduced Lawn Care at Inner-City Sites. The two inner-city sites visited, both located in New York City, have very limited grounds and parking areas compared to sites located in the Midwest and Sunbelt. Thus maintenance workers spend little time on lawn care and general outdoor maintenance (e.g., picking up debris, removing snow, maintaining playground equipment, caring for landscaped areas). Nor do supervisors spend much time dealing with subcontractors who provide these types of services. In contrast, maintenance workers at Sunbelt and Midwest sites are concerned with the use of hazardous chemicals (e.g., reading labels and MSDS for herbicides and fertilizers) and lawn equipment (e.g., reading operation and repair instructions for lawn mowers, snow and leaf blowers, and weed whips).

However, if lawn care, snow removal and related outdoor tasks are subcontracted, superintendents at suburban sites need to apply literacy skills to deal with subcontractors (e.g., reading specifications, soliciting bids, processing payments).

Increased Cleaning and Repair Demands at Inner-City Sites. Apartment maintenance workers at the inner-city complexes visited spend a relatively greater amount of time on routine cleaning tasks and repairs resulting from vandalism. Graffiti removal on both exterior and interior walls is a regular part of the maintenance routine. Workers at these sites regularly replace windows and light bulbs, repair broken locks and doors, and perform other minor repairs. Also, these sites are far more likely than other sites to have garbage chutes and trash compactors, which require frequent cleaning.

Some of these increased maintenance burdens directly affect the literacy challenges confronting maintenance workers at inner-city sites. For example, graffiti removal and cleaning of garbage chutes and trash compactors require the use of very strong and potentially hazardous chemicals. Workers should read safety precautions, directions for mixing and application, and directions for storage for these chemicals. However, in practice workers often avoid or ignore these tasks. Some of the repair tasks described above also require the application of literacy skills. For example, a worker might need to measure a window to replace a broken glass pane or to look up an apartment unit number to determine the dimensions of a broken door.

Presence of Elevators at Inner-City Sites. The presence of elevators (found only at inner-city sites) does not significantly affect the literacy demands faced by maintenance workers. Elevator repairs are routinely subcontracted and inspections are conducted by governmental officials. Superintendents are required to post inspection certificates but do not seem to do special paperwork related to elevators. Maintenance workers do regularly clean elevator walls and floors and replace light bulbs; however, these tasks do not usually require the use of special chemicals or other items.

Increased Maintenance Demands of Pools at Sunbelt Sites. The pools (and hot tubs) at Sunbelt sites generally are open for a much longer period of time (from the beginning of April through October) than are the pools at Midwestern sites (from the end of May until the beginning of September). Also, hotter temperatures for a greater period of time increase maintenance needs. Strong chemicals and complicated procedures requiring diverse literacy skills are involved in pool cleaning and water treatment. The chemicals and procedures used do not vary substantially between the two regions, but they are used more frequently and over a longer period of time in the Sunbelt. Neither of the inner-city sites visited has a swimming pool. As expected, maintenance workers interviewed confirmed that swimming pools are extremely rare at inner-city sites in general.

Another factor, peculiar to the Dallas-area, also increases the maintenance demands posed by swimming pools at the Sunbelt sites we visited. Because of geological conditions, swimming pools in the Dallas-area are prone to lifting out of the ground. Thus they are kept filled with water year-round to prevent lifting. Even when not in use, the pool water must occasionally be treated and cleaned to avoid the buildup of algae and grass, leaves, bugs and so forth. In contrast, pools at the Midwestern sites visited are usually drained, covered and ignored during the two-thirds of the year when they are not in use.

Increased Maintenance Demands of Air Conditioners at Sunbelt Sites. Air conditioning maintenance also poses increased demands for workers at Sunbelt sites. Air conditioners are in use for a considerably longer season. Also, the hotter climate increases the stress on air conditioners and the emphasis residents place on maintaining them in top working condition. Thus Sunbelt maintenance workers have to apply literacy skills more frequently to respond to service requests concerning air conditioners, inspect air conditioners, and to read schematics and to take air temperature and humidity measurements when conducting repairs.

Older complexes in the Sunbelt are more likely to have older air conditioning systems than are complexes in the Midwest or Northeast simply because air conditioning was introduced earlier in the Sunbelt. For example, at one of the Dallas-area sites we observed the maintenance of an old-fashioned, centralized chill-water air conditioning system (approximately 23 years old). The daily testing and treatment of the water used in the system, as well as frequent inspection and treatment of the apartment air handlers, extensively increase the maintenance burden and the need for workers to apply higher-level literacy skills (compared to the maintenance of more modern, individual apartment air conditioners).

Prevalence of Spanish-speaking Workers with ESL Needs in NYC and Texas. Entry-level maintenance workers at the New York City and Dallas-area sites generally are native Spanish speakers with low-level English language skills. Such workers, often with the assistance of their superintendent, find ways to minimize the basic skills demands of their jobs. For example, these workers, usually classified as porters, generally are not required to respond to service requests. They rarely need to read service request forms or corrective maintenance work orders or speak with residents. Similarly, the superintendent at one site premixes the primary cleaning chemical used by the Spanish-speaking porters so they do not have to read the English label on the chemical.

Although the superintendents at the New York City sites we visited both are native Spanish speakers themselves, neither of the superintendents at the Dallas sites speak any Spanish. These superintendents have had to find creative ways to communicate with their non-English speaking workers, requiring the application of their own literacy skills. For example, one superintendent draws on complex site plans in order to communicate with workers about the extermination and air conditioning inspection schedules. He also created a standardized list of daily job tasks performed by workers and had the rental manager translate it into Spanish. It should be noted that the workers using these materials also have to apply literacy skills (map reading and chart reading).

C. EFFECTS OF MANAGEMENT POLICIES AND PROCEDURES

During the course of the project, employees from two apartment maintenance companies--NHP Property Management, Incorporated and Gene B. Glick Management Corporation--were involved. The higher-level literacy demands varies substantially between the two companies. Major differences are also attributable to the specific features of the complex, which vary considerably between complexes within a given company. These differences, as outlined below, do not make the demands significantly greater at a given company. Moreover, the most important and frequently encountered "paperwork" involving daily work schedules, service requests and apartment turnovers -- requires essentially the same application of literacy skills by maintenance workers.

Preventive Maintenance Program. Three of the four NHP sites visited adhere to an extensive weekly preventive maintenance program. Each week the superintendent receives a packet of computer-generated "Preventive Maintenance Work Orders." Workers are assigned to complete the inspection and servicing tasks described. This entails reading and providing information presented in a fairly complex table format. Workers must interpret the descriptions of the tasks accurately in order to perform the required maintenance. The skills used to perform this task are the same as the skills used to respond to service requests/corrective maintenance work orders. However, some workers (certainly superintendents and handymen) at the NHP sites that follow a preventive maintenance program must apply these skills more often than do Glick workers.

Inventory Control Program. The inventory control program in operation at two of the NHP sites is a complex and time consuming task. This program requires a high level of organizational and record-keeping skills. Efficient and accurate administration of the inventory control program requires an understanding of the concept of a balance sheet. The two superintendents involved find this concept difficult to understand and apparently make errors when applying it. Most of the responsibility for keeping track of and reporting inventory is assumed by the superintendents, although at one site other workers are involved in keeping an on-going record of items stored in the workshop. In summary, an inventory control program is a special literacy challenge for the workers charged with implementing it. None of the Glick sites visited has an inventory control program.

Centralized Purchasing. Purchasing practices vary somewhat between the two companies. NHP maintenance superintendents are far more restricted than Glick workers in their choice of vendors and specific products purchased for maintenance due to NHP's buyer's access program. Glick superintendents are somewhat restricted in their choice of vendors for major appliances and must choose from a list of approved vendors. Glick superintendents in the Indianapolis area also have the option of purchasing basic supplies from a centralized warehouse, but are not required to do so. Both NHP and Glick superintendents must cope with the literacy demands of using vendor catalogs and price lists. In general, though, Glick superintendents spend considerably more effort on "comparison shopping." This difference in the purchasing process requires relatively greater analytical and decision-making skills on the part of Glick superintendents.

Competitive Bid Process for Large Purchases and Subcontracting. The Glick company requires maintenance superintendents to conduct a formal competitive bid process for large purchases and major subcontracting. Glick superintendents must read and interpret company specifications, manage the considerable paperwork involved in soliciting bids, and evaluate bids and justify their final choice of vendor or subcontractor. This extensive process requires the application of a considerable repertoire of reading, writing and analytical skills. In comparison, superintendents at the NHP sites visited select vendors and subcontractors through an informal process, relying on the vendors or subcontractors themselves to analyze any specifications. They are not required to do any special paperwork for making large purchases or choosing subcontractors for major jobs. It also seems that rental office or higher-level personnel (such as regional property managers) assume responsibility for this process at NHP complexes. Glick superintendents assume almost all of the responsibility for this process themselves.

Technical and Maintenance Manuals. Glick provides a technical manual (concerned with the technical aspects of performing maintenance tasks) and a maintenance manual (concerned with the administrative and procedural aspects of performing maintenance tasks) to maintenance workers at all its sites. These manuals generally consist of literacy materials that potentially support the performance of maintenance tasks. Very rarely is a task such that it requires consultation of one of the manuals. (For example, a superintendent might have to consult the manual to check if a particular vendor is approved by the company.)

Glick workers need a wide array of literacy skills (e.g., using a table of contents, skimming, interpreting schematics, applying step-by-step instructions) to make use of these manuals. Thus one might conclude that the company policy of supplying manuals increases the literacy demands faced by workers. However, at many sites workers rarely consult the manuals, often because they apparently lack the literacy skills required to understand and apply the information contained in the manuals. The company requires each worker to take an open-book test once each year covering the material provided in the manuals. This practice is intended to insure a worker's familiarity with the manuals. It has not had the effect of guaranteeing that workers integrate consultation of the manuals into their performance of maintenance tasks. In general, the test is viewed as a waste of time, except by maintenance assistants aspiring to become superintendents. These workers consider familiarity important to meet the formal requirements for becoming a superintendent but not for performing the job of a superintendent.

NHP does not supply any similar manuals to its maintenance workers. The presence of such manuals at the Glick sites potentially presents special literacy challenges (and opportunities for the use of printed materials to assist in the performance of maintenance tasks) to workers at these sites, although in practice workers often avoid using the manuals.

Quality of Company Forms and Documents. In general, NHP forms and documents are far better designed than Glick forms. NHP materials are more readable and provide clearer clues to workers as to how they should use the forms (i.e., how to use information provided on the form or what information to supply on the form). Glick forms often provide vague instructions to workers, if any, and consequently often are misinterpreted and misused. In addition, some Glick documents that apparently are produced in-house (such as some of the materials provided in the manuals) contain grammatical, spelling and typing errors that further increase the difficulty encountered in using them. Thus, on the whole, the characteristics of Glick forms and documents unnecessarily increase the literacy demands placed on workers and enhance the likelihood of potentially costly errors.

Maintenance Personnel Job Roles. NHP uses a more complex job classification system for maintenance workers than does Glick, and the jobs roles of NHP workers are more clearly differentiated than the job roles of Glick workers. The lowest NHP job classification, porter, in general is a less skilled position than the lowest Glick job classification, maintenance worker. Also, in most cases porters' jobs are structured so that the tasks performed are highly repetitious and follow the same schedule on a weekly if not daily basis. Porters require very minimal literacy skills. Consequently, this position can be filled by people with very little knowledge of English. Entry-level Glick maintenance workers face relatively greater maintenance and literacy demands.

NHP handymen are roughly equivalent to Glick maintenance assistants in terms of their job responsibilities and literacy skill needs. However, at some NHP sites a maintenance worker is given exclusive responsibility for preparing apartments for new residents and the handyman is given primary responsibility (with some assistance from the superintendent) for responding to residents' requests for service. Hence these workers' job responsibilities are more narrowly defined than are those of equivalent Glick workers and the former cope with a more restricted range of literacy tasks (and repeat the same tasks more frequently). In contrast, Glick workers are usually considered "jacks-of-all-trades" and must be able to perform diverse maintenance, and consequently, literacy tasks.

Training Programs. NHP provides very little structured in-house training to its maintenance workers. New workers are trained informally by experienced workers. More specialized training must be obtained from outside sources (e.g., the union, a professional association, a technical school). Glick, in contrast, offers a variety of technical training to its workers. Workers in the greater Indianapolis area can take courses in specialized technical areas at a centralized facility. Workers are not required to take this training, although successful completion of various courses does presumably help workers advance to higher positions. Workers taking Glick courses encounter a great amount of printed material, particularly schematics. Good basic literacy skills are a prerequisite for benefiting from much of this technical training. According to workers' descriptions, much of the training provided by professional associations, technical schools and unions also requires workers to use printed materials, such as installation instructions, schematics and blueprints.

Relationship Between Rental Office and Maintenance Staff. Overall, rental office personnel at NHP sites play a greater role in managing apartment maintenance than do rental office personnel at Glick sites (with a couple exceptions). For example, NHP rental office workers assume responsibility for some administrative tasks (e.g., purchase orders) generally conducted by maintenance staff at Glick sites. This practice transfers some of the burden for performing tasks requiring literacy skills to rental office workers at NHP sites. Glick workers, particularly superintendents, must possess the requisite literacy skills to perform these administrative tasks themselves.

Centralization of Reading Tasks. Supervisors handle most of the tasks that require reading, computation and writing at almost all sites visited. Though there are exceptions -- at one Indianapolis site workers were given far more responsibility than at other sites (see further discussion of this site in Explanation for Paucity of Reading Tasks Performed by Maintenance Assistants, below) -- most superintendents perform themselves tasks requiring higher level skills and carrying more responsibility. This is especially true of administrative aspects of the maintenance work. Nearly all ordering of materials, supplies and services is handled by the superintendent at nearly every site visited. Many superintendents expressed a need for and a desire to have maintenance assistants help with these tasks, but most indicated that either the assistants were not capable of doing these tasks because of limited basic skills or there was insufficient time to train workers adequately. Some superintendents who were training assistants to handle more responsibility were frustrated at the slow progress or with the results of the assistant's performance.

Though superintendents handle many of the administrative tasks, they entrust assistants with most maintenance tasks, even when those tasks potentially require high level literacy skills. For example, a superintendent will readily assign an assistant to apply a hazardous chemical (insecticide, cleaning solvent, pool chemical) and never recognize the reading of the safety label as a part of the safe and effective completion of the task. Though reading a chemical's safety label may be critical to its safe application, a low literate worker will still be expected to apply the chemical.

In some cases, workers with low literacy skills were assigned tasks with literacy components far beyond their ability or training. For example, one maintenance assistant with very marginal basic skills was responsible for maintaining the chlorine and pH balance in the pool. The worker was misusing the chemical test kit and thus adding random amounts of chlorine, muriatic acid, and soda ash to the pool. Consequently, in addition to being potentially unsafe for residents, the pool needed to be "shocked" and treated with algicide frequently at some expense to the management company. In addition to basic skills deficiencies, it appeared that the worker had never been taught the proper procedure. His inability to read the instructions and make sense of the numerical tables involved prevented him from learning the process on his own. His coping strategy was to create his own process, using the vials and charts in the test kit in an effort to appear to be doing the task correctly.

A few superintendents seemed more sensitive to and capable of accurately assessing a maintenance assistant's literacy skill level. Many superintendents seemed not to recognize deficits in their workers and many had severe basic skills limitations themselves. Many superintendents, since they did not require or expect assistants to perform tasks that involved literacy skills, had no indication of a worker's literacy capabilities. Additionally, many workers and superintendents did not consider consulting a manual or taking a measurement using a rule or gauge as a basic literacy skill. They tended to consider these technical skills rather than basic literacy skills.

At a few sites, superintendents prevented assistants from becoming involved in tasks with more responsibility and requiring higher level skills, even when assistants appeared to have the required skills. In fact, superintendents may have been following proper procedure, especially at non-Glick sites where there were more formally differentiated job titles and responsibilities. Some superintendents seemed to want to maintain their authority over assistants (perhaps out of insecurity or fear of competition for their job) and acted as a gatekeeper of information and job knowledge. At these sites, assistants handled only the routine maintenance tasks that required the lowest level of basic skills. Another explanation for this "power brokering" might be that superintendents want to justify the pay differential between superintendents and assistants. Though the details were never revealed, superintendents at several sites apologetically noted that there was a "huge" pay differential between the two positions. Some superintendents may have felt the need to maintain control of the higher level job tasks to justify their salaries to themselves and their workers.

The Relationship Between Rental Office and Maintenance Staff. The relationship between the rental office and the maintenance staff is often antagonistic or, at best, tolerant. A rift existed between these two groups at all sites, with the only difference being the degree of hostility and frustration.

The rental office personnel seemed to be more "print-oriented," while the maintenance staff seemed more "hands-on" in their approach to both communication and physical maintenance. Rental managers seemed to perceive the maintenance staff as inferior and the role of maintenance as less important than the role of the rental office. Maintenance staff usually perceived the rental manager as unskilled, unknowing, and unappreciative of the responsibilities of maintenance work. These tensions often resulted in inhibited communications between the two departments regarding apartment turnovers, and residents' requests for repairs or maintenance service.

At least one site, the rental office handled nearly all of the administrative tasks including the assignment of maintenance tasks, purchasing of supplies, and evaluation of bids for subcontracting. The maintenance staff at this complex performed virtually no administrative reading tasks, and some of the maintenance assistants were obviously not meeting the literacy demands of many maintenance tasks. Though this was a relatively new complex, while we visited the maintenance crew was constantly "fighting fires." One had to wonder if the problems we observed were the result of poor management, ineffective communication between the two departments, and the apparent low literacy skills level of the maintenance staff.

Two other factors that contributed to tensions between these departments are: 1) the rental office is nearly always the liaison between the resident and the maintenance staff; and 2) maintenance budgets are controlled by the rental office. The rental office's role as broker between resident and maintenance staff creates tension because rental office personnel take the requests and complaints from residents. They frequently blame the maintenance staff for resident dissatisfaction.

The budgeting issue is more complex. Apparently at most sites, the maintenance budget is controlled by the rental office. Also, rental manager bonuses are contingent upon under-spending the budget. Friction results when rental managers maintain secrecy about budget amounts and when they restrict purchases of materials or services requested by maintenance superintendents. Maintenance superintendents strive to "get the job done" and must often sub-contract work or order quality supplies. Rental managers frequently limit the amount of sub-contracting a superintendent can do in order to reduce sub-contracting costs. Additionally, rental managers often pressure superintendents to order cleaning products and replacement parts that are less expensive, but often not as effective as the more expensive items.

The result of these policies is money "saved" in the short run -- an advantage for the rental manager, but increased burdens on the maintenance staff and long-term costs resulting from using cleaners that work poorly or replacement parts that do not last. The tensions between rental office and maintenance staff are exacerbated when residents are dissatisfied with the quality of service because of low-quality supplies and materials. Residents complain to the rental office and the rental office responds by reinforcing the notion that the residents' woes are the fault of a low-skilled maintenance staff, and the cycle continues.

CONCLUSIONS: A MAINTENANCE SKILLS CURRICULUM

A. CONCLUSIONS:

1. Productivity and job advancement in the building maintenance "industry" are impeded by a lack of workplace literacy and related competencies.

2. The workplace competencies needed include:

   a. **Communication skills** -- including English as a Second Language -- required to follow and give instructions, communicate with residents, negotiate with contractors, and interact with rental agents and building managers.

   b. **Document literacy** regarding work-orders, blueprints, meters/gages, labels, and charts.

   c. **Prose literacy** regarding instructions, contractor proposals, safety instructions, company policy, and union communications.

   d. **Quantitative literacy** regarding time and material budgets, measurement of quantity and spatial dimensions, and basic probability as it affects safety and preventative maintenance.

   e. **Problem-solving abilities** for tasks that require a combination of reading, writing, computation, and visualization skills and the integration of information from a number of different sources. Examples include completing the paperwork to request bids from outside contractors, reading schematics and charts to maintain heating and air conditioning units, and reading labels and Materials Safety Data Sheets in the use of chemicals.

g. **Higher-order thinking skills** for functions such as inventory control, preventive maintenance, and evaluating proposals.

3. Maintenance workers will be resistant to learning "reading" or what are perceived as academic skills. Instead the learning will have to be imbedded in performing "hands on" practical work.

4. The value of enhancing maintenance workers' skills will depend on the organization's ability to use them. Supervisors, rental agents, managers, and general policy that have already adjusted to low literacy levels will have to change; otherwise the newly acquired skills will go unused.

5. A means of enhancing the literacy levels of maintenance workers is likely to have wide applicability for persons with a "hands on, schooling is not for me" mind-set.

B. IMPLICATIONS FOR A MAINTENANCE SKILLS CURRICULUM

As shown below, according to the Bureau of Labor Statistics (BLS) 3.3 million persons were engaged in "cleaning and building service occupations, except private households" in 1988. BLS projects that number to grow to 4 million by the year 2000. Janitors and cleaners are 2.9 million, projected to grow to 3.5 million. Construction workers are another 3.8 million, expected to grow to 4.4 million.

Occupation	1988	2000
cleaning and building service.......	3.31	3.96
janitors and cleaners..............	2.89	3.45
construction trades................	3.81	4.42
TOTAL	10.01	11.83

Even if half of the persons in these occupations needed enhanced skills, a curriculum that served them would be helpful in the overall national workplace literacy effort. The following is a preliminary guide to a maintenance skills curriculum.

PRELIMINARY DESIGN FOR A MAINTENANCE COMPETENCIES CURRICULUM

A. BASIC SKILLS NEEDED TO PERFORM SUCCESSFULLY

Reading

- comparing and contrasting
- combining information from multiple sources that contribute to the completion of a task
- selecting parts of text to complete a task
- distinguishing between relevant and irrelevant information in text
- using charts, diagrams, and schematics
- reading two- or more column charts to obtain information
- locating information at intersections of rows and columns
- applying information from tables or graphs to locate malfunctions or select actions
- identifying components within a schematic
- identifying details, labels, numbers, parts of an illustration, parts from a key or legend
- interpreting three-dimensional drawings of objects locating information
- using tables of contents and indexes
- locating pages, titles, paragraphs, figures, or charts needed to answer questions or solve problems
- using a completed form to locate information to complete a task.

Writing.

- writing brief, descriptive accounts of activities or transactions performed
- summarizing essential details for written communication
- transferring numbers, codes, dates, figures from equipment or written sources onto appropriate sections of forms.

Computation.

- making measurements and calculations
- reading numbers or symbols from time, weight, distance, and volume measuring scales
- using a measuring device to determine an object's weight, distance or volume in standard (English) units
- using a calculator to perform basic arithmetic operations to solve problems
- converting feet to yards, yards to feet
- carrying out arithmetic computations involving dollars and cents
- reading and writing decimals in one or more places
- rounding off decimals in one or more places
- estimating
- determine if a solution to a mathematical problem is reasonable
- reading, writing and computing percents.

Visualization. Another challenging literacy-related process is that of visualization. Workers are often required to visualize structures that they are not physically able to see. For example, when repairing a faucet, a worker can see it, but when repairing electrical wiring or plumbing, the worker must visualize the wiring or pipes and how they run through the walls of the apartment. This visualization process is often aided by blueprints and schematics, but is often more of an internal mental process most successfully performed by experienced workers.

B. SKILLS LEADING TO PROMOTION

Though the maintenance worker's environment is print-rich, only a small percentage of workers actually read even a fraction of the materials available. To become a competent supervisor, however, maintenance workers will have to:

- Gain a job orientation to reading skills.

- Cope with unreliable and hard-to-read printed materials.
- Deal with subordinates who embrace an ideology that stigmatizes reading.
- Replace short-term practicality with long-term cost effectiveness as a decision guide.

Maintenance supervisors need a job orientation to reading skills. The kind of "literacy" maintenance workers need on the job is not what they have been taught in high school. In the maintenance field, there is an emphasis on reading blueprints, meters, gauges, and multiple sources of information to solve a problem or make a decision. Bridging the gap between high school reading and job reading is a difficult transition, especially for individuals with non-technical exposure.

Many maintenance workers need such reading concepts as knowing to look for a key or legend when reading a blueprint with symbols. They need to be able to recognize different views (e.g., top view, exploded view, cut-away view) when reading illustrations of parts or assembly instructions. In computation for example, one worker had adequate math skills in addition, subtraction, multiplication and division, but did not understand basic accounting principles required to maintain the balance on an inventory sheet. Not understanding the relationship among the columns on the account sheet, he created an record system intelligible only to himself.

Maintenance workers must overcome unreliable and hard-to-read printed materials. Materials that were poorly developed, error-filled, inaccurate, or written at extremely high levels was found at all sites. Even maintenance workers who were inclined to read often gave up rather than struggle to overcome these obstacles. The Material Safety Data Sheets are a prime example of high level reading. MSDSs are required by law to accompany any hazardous chemical (e.g., insecticides, cleaning solvents), but they are often filled with highly technical, bureaucratic language, and presented in a format which makes them difficult to read for even skilled readers without some instruction. Also, some company-designed forms were poorly designed and lacked basic instructions or labeling that would facilitate their use. For example, one form we encountered has a blank area labeled "PART" to be filled in; the information being requested is the part number from the appliance. A worker unfamiliar with the form would not know what he/she was being asked to do. A similar form more thoughtfully designed was labeled "APPLIANCE PART NUMBER." There were numerous instances in which forms were ambiguous and unclear, making them difficult to read and increasing the likelihood of errors.

In some cases company forms contained grammatical errors, typographical errors, and content mistakes, which made reading them problematic, especially for low-skilled readers. Documents designed for one purpose were often used for another, requiring the reader to compensate for discrepancies. Ideally, the forms and labels will be improved. In the meantime, readers must be equipped with strategies for detecting these errors, evaluating them and going on with the task. Otherwise, they will give up and assume they are not capable of dealing with any print materials.

Maintenance workers frequently reported that it was not necessary for them to read installation instructions unless they contained such specific information as code numbers (such as described below in the thermostat replacement example). These instructions are often written generically or without considering specific situations. Workers find that to be successful they often need to try strategies different from those described in the instructions or to make adjustments or innovations not mentioned in the instructions. Often it is easier and quicker to rely on one's experience and figure out the assembly or installation by trial and error. In these cases, not reading the instructions may lead to later complications when repairs or maintenance is needed.

Supervise maintenance workers who embrace an ideology that stigmatizes reading. The single most influential factor in reducing reading is the pervasive ideology among workers that characterizes the need to read in order to perform a work task as a weakness rather than a strength. Workers articulated a dichotomy that put "readers" on one side and "doers" on the other. They perceive themselves as "doers" and failed to acknowledge the possibility that integrating reading in the completion of most tasks would improve their efficiency and effectiveness. Recognition of the importance of reading or the need for reading on the job was not evident. Frequently workers reported that they did not need to rely on printed material to help them with their jobs. We observed, for example, workers who would sooner search out electrical problems by trial and error rather than refer to a wiring diagram. The underlying assumption was that reading is an indication that one does not know the job. To admit to the need for support from printed material was to admit inadequacy.

This ideology was expressed at almost all sites in various ways. Among workers at all sites there was a strong emphasis on learning by doing and learning from watching someone else. Most superintendents did not encourage reading or support the use of blueprints, schematics or company technical manuals on a regular basis. Workers were not expected to read safety warnings, MSDS's or labeling on cleaning solvents or chemicals used on the job. Most superintendents embraced this ideology as well, so there was little modeling of positive reading behaviors.

Many of the workers observed and interviewed had low literacy skills and low self-confidence in their ability to interact with printed materials. But many of these same workers were extremely competent and confident in their ability to perform routine maintenance. The perception that the maintenance field is "hands-on" attracts individuals who may have had little success in school and other jobs that required more interaction with printed materials. Most of the experienced workers interviewed indicated that they learned what they know "by doing and not from books." Furthermore, a number of these workers claimed to have learning disabilities such as dyslexia and handicaps such as speech impediments. Also, maintenance work is attractive to immigrants and others for whom English is a second language because with some background knowledge and experience, they can perform many maintenance tasks without being able to read, write and sometimes even speak English.

There was one site that did not embrace this ideology, largely because of the leadership of the maintenance superintendent. According to their supervisor, workers at this site were regularly reminded of the need to keep current of new technologies and to keep existing skills sharp. Reading the company technical manual during slow times was encouraged and workers were rewarded with recognition, autonomy and greater responsibility on the job. The superintendent had high expectations of his assistants and each assistant we interviewed echoed the refrain that he could do "just about anything the superintendent could do." In fact, the assistants took over the superintendent's job when he was away. They exhibited confidence in their ability to perform not only routine maintenance tasks, but a variety of administrative tasks which were handled exclusively by superintendents at other sites.

These workers seemed more enthusiastic about their work and more satisfied with their jobs than maintenance assistants at other sites. Workers here tended to recognize the use of printed materials as essential, integrated aspects of many tasks in their job. We encountered none of the defensiveness about on-the-job reading that we frequently encountered at other sites. Rather than being a gate keeper filtering the flow of information from management to worker, this superintendent worked to keep his assistants informed and expected them to exercise their judgment. This was the only site at which we encountered this dynamic and the contrast with the other sites was striking. The curriculum for supervisors clearly must model the behavior or this exemplary superintendent.

Replace short-term practicality with long-term cost effectiveness as the guide to action. Many maintenance tasks simply do not require workers to read in order to perform the task at least to a degree that seems to be adequate at the time. However, the task could be performed more effectively and efficiently if the worker had relies on supporting printed materials. There were very few maintenance tasks we encountered that required a worker to read to complete the task. Trial and error or imitation would almost always work if the worker was unsure about the process. A worker might be able to replace a faulty part simply by removing the old part, watching how it was connected and then installing the new part in exactly the same way. Reading accompanying installation instructions would not be necessary and could in fact cause the worker to take longer to do the task. Many maintenance tasks are like this. A worker can learn a task by watching or doing, and then successfully perform that task hundreds of times.

An effective curriculum must show why this approach inhibits maintenance workers' adaptation to change in their work environment. For example, problems arise when a new type of part must be used. One worker described replacing dishwasher thermostats. This had been a routine part replacement task for years. Then, the superintendent found a cheaper replacement part from a different company. The wiring on the original part was colored coded, while the wiring on the new replacement part was numbered instead. The only way to install the new replacement thermostat successfully was painstakingly to read the instructions that matched the old color code with the new numbering code. Without the printed instructions the successful completion of the task would be impossible. This is a typical problem-solving exercise that should be part of the learning materials.

There are many other examples. A worker could eventually arrive at the correct wiring configuration for a furnace blower switch by simply trying different combinations until finding the desired one. The task could, however, be performed much more quickly if the worker referred to the schematic and key on the furnace panel that shows the proper wiring.

Often by using the trial and error method instead of following printed instructions, workers arrive at a solution that only appears to be correct. The job may last for a while, but the problem may eventually reoccur, or the repair may cause another problem that will require further maintenance in the future. Often evidence of incorrect installation, electrical wiring, or pool treatment will not show up for days or weeks after the maintenance intervention. The potential supervisor must learn that these problems may be time consuming, costly and unsafe.

C. GEOGRAPHIC VARIATIONS

Results of this study indicate that geographic location alters the context but does not affect the basic literacy demands of maintenance workers. Similarly, physical characteristics of sites located in different areas cause variations in the ways skills are used. These variations, in and of themselves, do not affect literacy requirements.

Curriculum should include optional lessons on literacy for lawn care and pool maintenance. These should be used at Sunbelt sites, where increased demand for pool maintenance results in more frequent use of strong chemicals and air conditioning units require more frequent inspections and maintenance. These units should be replaced at inner-city sites with lesson dealing with cleaning and repair demands. Lessons regarding elevators should reflect the reality that repairs are subcontracted and inspections conducted by outside agencies.

Some lessons should be designed around the literacy demands that arise because older equipment requires more maintenance. Replacement parts may be different and the use of instructions and schematics becomes more important. Also, at sites where workers are unionized, memos and bulletins become additional required reading.

Special lessons arise where the supervisor manages workers who lack English proficiency, such as in New York City and the Sunbelt sites. Here the maintenance supervisors must take special measures to communicate to these workers or restrict the range of delegated tasks.

In any case, there is a loss of productivity on the part of both the maintenance worker and supervisor. Thus, the ESL is an issue that should be handled on an industry-wide basis, since it is likely to have and increasingly negatively impact in the future.

D. VARIATIONS BECAUSE OF COMPANY POLICIES AND PROCEDURES

Management policies and procedures differ among companies. The possible differences expand the overall literacy needs of maintenance workers who are looking to change jobs. Documents, forms, and manuals vary among companies. Running programs such as preventative maintenance, inventory control, and centralized purchasing requires increased literacy (especially when the associated documents are written or formatted in a confusing and obtuse manner).

Training practices vary widely and affect literacy demands. Training places a greater immediate literacy burden on the trainee who must deal with training manuals and other technical materials used in the course.

The extent to which the rental office executes maintenance supervisor tasks varies between companies and alters the supervisors required literacy level. Supervisors should be able to handle the administrative support of maintenance office functions. They should have the skills to delegate tasks, handle budgets, schedules, and other "control" issues, and affect overall motivation and tone in the building.

HIGHER ORDER SKILLS: THE EFFECT ON COSTS, WORKERS, AND RESIDENTS

Proficient maintenance supervisors and workers should understand and cope with the connection between basic skills deficiencies and costs, safety, worker satisfaction, and resident satisfaction. Skills include communication, management, and other "soft" skills as well as higher order problem-solving capacity.

Costs. Avoidance of literacy tasks can increase costs when workers replace or "swap" parts that could be repaired rather than deal with manuals, schematics, or other printed materials to diagnose and repair. One superintendent noted that a high number of circuit boards were erroneously being diagnosed as faulty and replaced, when in fact, the boards were not faulty. It appeared that it was easier to replace the part than to take time to identify the problem correctly. This anecdote is the basis for a good lesson. Other lessons can be drawn from the following:

- ineffectiveness results from trial and error repairs that do not work or do not last

- products are wasted or ineffectively used

- repairs are adequate, but not totally correct

- work is slowed by workers' avoidance of printed materials

- work is slowed by inability to use necessary printed

- workers repeat efforts to make repairs before achieving success.

According to the supervisors interviewed, sub-contracting represents one of the most costly aspects to maintenance at nearly every site visited. Often, superintendents indicated that they were forced to subcontract work because they did not have time to complete the necessary maintenance with the existing crew. These "make/buy," scheduling and budgeting problems form the basis for exercises in higher-order thinking skills.

Safety. Failure to read and apply information from printed materials associated with some tasks can increase personal risks to workers and residents. Lessons in reading can be built around the following potential hazards:

- improper concentrations of chemical cleaners or pesticides resulting from failure to mix ratios correctly

- failure to wire appliances or apartment circuits according to specifications in schematics

- failure to heed warnings on labels (e.g.f, fire hazards, explosion hazard, mixing ammonia and chlorine products)

Additional lessons should be structured around situations where workers disregard printed instructions, cautions, and warnings, particularly with regard to hazardous chemicals. If the damaging effect is not immediately evident, (i.e., if the worker is not burned by contact or overcome by fumes) then workers assume that the hazard does not really exist. There is a general consensus that the warnings on labels are overstated.

Frequently, workers spoke of instances when they did not follow safety guidelines. (For example, most electrical repairs are most safely made when the electricity is turned off. Written installation and repair instructions often stress this precaution. However, among skilled and experienced electricians, it is a matter of professional pride that they do the work while wires are "hot.")

Clearly, a consensus must be formed at what is the right behavior. Otherwise the lessons will be deemed unrealistic.

Worker Satisfaction. Supervisors should understand that an inability of workers to meet the demands posed by printed materials may be a cause of worker dissatisfaction. Improving workers' basic literacy skills may have the effect of:

- reducing turnover
- improving an individual's self-esteem
- reducing worker frustration created by inefficiency
- improving an individual's adaptability to changes in the environment
- making reliable workers more promotable.

Resident Satisfaction. Workers often rely on the sometimes more time-consuming trial-and-error method instead of making accurate repairs quickly using printed materials. This can cause reduced resident satisfaction if workers take longer than necessary to make a repair or must return for repeated service causing inconvenience to the resident.

Possible Benefits of Avoiding Printed Materials. The curriculum must, to be realistic, recognize the benefits that maintenance assistants' derive from finding ways around depending on printed materials. In some cases, workers may be faster at performing repetitive tasks. Similarly, particularly innovative or knowledgeable workers may be quicker at "figuring out" a problem without the use of printed material. Also, in this work environment it sometimes is not practical or time-efficient for workers to manage printed materials. For example, if a box with instructions is thrown out or a chemical label is obscured by spilled chemical, it is more time-efficient to proceed without printed materials than to take time to find the missing material.

The curriculum must also recognize that companies face a wage versus productivity balance. If they can pay low wages by hiring low-skilled workers who can learn and solve problems adequately by trial-and-error, imitation or innovation, then they save not only training costs, but the higher wages required to retain workers with higher level skills.

COMPETENCY ASSESSMENT

The maintenance worker job cluster is replete with areas where literacy skills and practices can be improved. A wide range of literacy skills is needed--particularly to maintain a safe environment and to encourage promotion to the supervisor level. The tasks documented in Appendix E could lend themselves to form a "test" of maintenance workers basic skills. Such a "test" would include simple job tasks and evolve to more complex tasks.

An incoming, inexperienced maintenance worker might be expected to complete items 1-3 without supervision and items 4-7 with supervision. Maintenance workers aspiring to be promoted to supervisors might be expected to complete more complicated tasks 8-10 (with supervision at first). The job task analyses delineated in Appendix E, provide specific descriptions of the following job tasks:

1. Informing Residents About Service In Their Apartment.
   Objective--to complete a simple document (door tag) involving limited reading, writing, and problem solving skills.

2. Using a Daily Job List.
   Objective--to complete a simple document involving limited reading, writing, and math skills, including setting priorities and problem solving.

3. Locating an Apartment Using a Map.
   Objective--to use an apartment property map to locate specific apartments and areas.

4. Completing an Annual Inspection Report.

Objective--to use several documents in the course of inspecting an apartment, including annual inspection report forms, maps and key sign-out sheets; involves limited reading, writing, and problem solving skills.

5. Responding to Requests for Service in Apartments.

Objective--to use several documents in the course of servicing an apartment (in this example service a clogged drain) including service record forms, maps, key sign-out sheets, inventory or parts catalog, and door tags; involves more complicated reading, writing, math and problem solving skills and the integration of different kinds of information.

6. Using a Technical Manual to Solve an Electrical Problem.

Objective--to use a technical manual to determine how to make a repair (in this example repair an electrical switch); involves more complicated reading and problem solving skills such as identifying the problem, formulating possible solutions, locating the information in the manual, using schematics, charts, and diagrams, and following specific directions to repair a switch.

7. Weatherizing an Apartment Complex.

Objective--to use various forms to check that an apartment complex has been properly prepared for summer weather; involves the integration of many skills such as reading labels, gauges, charts, diagrams, and directions to check air conditioning, pools, alarms, thermostats, clocks, balconies, etc.; involves higher order problem solving and reasoning skills.

8. Completing Move-In Procedures.

   Objective--to use various forms to assist the supervisor/property manager and resident with the moving-in process. Similar to the preceding task, the move-in procedures require the synthesis of a number of forms and basic skills. The move-in process, however, involves important communication skills among maintenance worker, supervisor/property manager, and resident.

9. Completing Forms for Subcontracted Work.

   Objective--to use a series of more complicated forms to complete a service work order for subcontracted work (under a specified dollar amount); involves using several tabular forms, translating complicated information, and completing a series of quantitative steps to arrive at a total cost.

10. Completing Forms for Soliciting Competitive Bids.

    Objective--to use a series of forms to provide the specifications for subcontracted repairs that require competitive bids (over a specified dollar amount); involves multiple steps and complex prose, document, and quantitative literacy.

Items 1-7 reflect the scope and range of work required by maintenance workers. They provide a framework for training maintenance workers to complete job tasks while also addressing the basic skills required. Items 8-10 reflect the additional skills needed by maintenance workers if they are to be advanced to supervisors. These skills are higher level communication, problem solving, and the ability to integrate and synthesize a great deal of complicated information and, thus, handle paperwork.

RECOMMENDATIONS

Both school-based and workplace-based education programs should be developed and implemented. There are, however, a number of obstacles that need to be overcome and issues that need to be addressed. For a training intervention to be effective in improving workers' performance, it will need to:

- identify and cope with learning disabilities and ESL issues
- combat the ideology that is prevalent among maintenance assistants counteract workers' habitual approach to reading
- cover the wide variety of skills required of maintenance workers
- adapt to the wide range of workers' skill levels
- encourage workers to use judgment to evaluate the usefulness of printed materials.

Workplace-based programs should also seek to:

- acknowledge and react to the feeling among workers that those who are better trained should be paid more
- improve the poor quality of printed materials in the environment when possible
- regulate the distribution of responsibility between the maintenance staff and the rental office, and between maintenance superintendents and maintenance assistants

The relationship between the rental office and the maintenance staff is relevant to the literacy issue because the extent to which the rental office wants to maintain control is dependent upon the basic skills of the maintenance staff. The rental office argues that it should have control over certain tasks that require literacy skills because the maintenance staff is not capable of meeting the basic skills demands of those tasks (communication with residents, budgeting, etc.). If literacy training is going to be effective in this environment, this issue of control and the distribution of power within the organization needs to be addressed. Furthermore, the issue becomes one of motivation. If maintenance workers are to be trained to meet the demands of more sophisticated job tasks, then they must be given the responsibility for doing those tasks in the work environment. Otherwise, workers will have little motivation for learning more advanced skills. Additionally, transfer of skills from training to the workplace will be more successful if workers have the opportunity to apply those newly acquired skills on the job.

For effective change to take place, this issue must be addressed at higher levels within property management companies. Change can be effectuated through formal policy and through informal programs that offer incentives and open communication lines among workers, supervisors, and rental office staff.

PRELIMINARY NAEP CROSSWALK

A. INTRODUCTION TO THE NAEP TAXONOMY

In the course of conducting the latest National Assessment of Educational Progress (NAEP), the Educational Testing Service (ETS) developed simulation items for measuring functional literacy ability. They were developed with the premise that task performance is based on what one must do with material presented rather than the mode of task presentation or response (e.g. reading, writing, mathematics, etc.). This concept is responsive to a growing body of research that indicates that different materials or formats are associated with different contexts. Numerous research has shown that a large proportion of adult reading tasks in the context of work involves documents, charts, graphs, and forms rather than prose. The use of such documents is associated with different purposes and frequently different reading strategies. This differentiation between prose and document literacy resulted in Sticht's distinction between "reading to do" and "reading to learn".

In the NAEP assessment, literacy tasks are categorized in terms of types of materials or formats and their purposes or uses. It involves three classes of literacy: prose, document, and quantitative. Prose literacy is characterized by the ability to read text information for literal information, interpretations, and major themes or organizing principles. Document literacy involves gleaning literal and corresponding information using separate document(s). Quantitative literacy is characterized by the ability to use mathematical operations such as addition, subtraction, multiplication, or division, either singly or in combination, to solve problems embedded in printed material.

The unique feature of the NAEP study is its analysis of the underlying processes involved in performing literacy tasks and its continuum or scaling of these processes as shown in Appendix F. For prose literacy, the ability to read text information is analyzed on a continuum defined by the number of features that readers must identify to match information requested. The simplest end of the continuum requires readers to match information on the basis of a single, commonly shared feature; more difficult is matching on the basis of three literal features; and most difficult is matching on the basis of three categories of information such as people, action, and situation. The ability to interpret text information involves simple interpretations based on personal experience, more difficult interpretations based on familiarity with using the type of text, and even more difficult interpretations requiring the reader to compare and contrast information between two classifications. The ability to understand the theme or organizing principle ranges in difficulty depending on length and familiarity of text. Researchers noted that these sets of tasks overlap and that successful performance involves various combinations of the three tasks.

An analysis of the underlying processes involved in document literacy reveals that there are three major characteristics associated with task difficulty: 1) the number of features that readers must identify in the question or directive and match to features of information in a document, 2) the degree to which feature information corresponds to the requested information in the document, and 3) the number of representations in the document that have at least one feature in common with those in the question or directive and the number that serve as distractors or possible right answers for the reader. Simple tasks involve personal background information, such as understanding a Social Security card, whereas more difficult tasks involve information not represented in the respondent's background of knowledge, such as following directions for setting up a room. Greater difficulty levels involve the matching of information on two commonly shared features where exemplars serve as distractors to the reader, such as understanding a paycheck stub. At succeeding levels of difficulty the reader is required to match information on the basis of increasing number of features at literal or interpretive levels, such as reading a bus schedule. For quantitative literacy tasks, difficulty is determined by the type of operation required, the number of operations needed, and the extent to which these operations are embedded in the literacy task. The simplest tasks require adding two numbers; more difficult is the additional task of entering the number in the correct space on a document, such as in a checkbook. The next level of difficulty requires either two sequential operations or the application of a single higher level operation (multiplication/division), such as might be required to total a restaurant bill, compute tip, and count change. The most difficult levels require the reader to disembed feature of a problem and apply a sequence of operations, such as computing the total amount of interest charges, total amount borrowed, monthly payment, and total number of payments from information in a home equity loan advertisement.

B. CROSSWALK PROTOTYPE DEVELOPMENT

An added activity of this study was to develop a scaling method, comparable to the NAEP, by which to determine the difficulty of maintenance worker tasks. Efforts to obtain NAEP items and technical information to develop a comparable scale proved futile, so the crosswalk process, based on the few NAEP items available, had to be very limited in scope.

The initial crosswalk is shown in Table 4. The rating method is based on scaling each sub-task on three criteria:

- o Type of Information--is based on whether information is literal or inferential; the more

literal the easier the task, the more inferential the harder the task.
-Easy--"script-based knowledge", i.e. knowledge in one's head or rudimentary job information
-Moderate--"text explicit", i.e. information specifically stated or easily implied from stated facts
-Hard--"text explicit", i.e. external information not stated,but needed for processing the information to execute a given task

- Materials by Task Number of Organizing Categories (OCs)--refers to the number of categories of information on printed material that need to be matched to the "question" or sub-task. The number and type of OCs determine the final rating. The greater the number of features to be matched the harder the task. Also, feature match of text implicit information is harder than that of text explicit information. These two factors combine in determining the rating.

- Materials by Task Number of Specific Details (SPEs)--refers to the number of details to get through to find the specific information; the more SPEs, the harder the task. This rated based on the number of paragraphs or the number of details one must read to find the needed information.

CHARACTERSTICS	PROSE LITERACY	DOCUMENT LITERACY	QUANTITATIVE LITERACY
SCORING OF LEVELS	TYPE OF INFORMATION	LEVEL OF INFORMATION	TYPE OF OPERATION
EASY (0-225)	Personal knowledge; rudimentary job info.	Personal knowledge; rudimentary job info.	Addition, subtraction
MODERATE (226-324)	Basic job information	Basic job information	Multiplication, division
HARD (325+)	Advanced job information	Advanced job information	Higher math: Conversions; algebra; geometry
NO. ORGANIZING CATEGORIES (OCs)	FEATURE MATCH	FEATURE MATCH	NUMBER OF OPERATIONS REQUIRED
EASY (0-225)	1 feature/literal or interpretive (text explicit)	1 feature/literal or interpretive (text explicit)	1 operation
MODERATE (226-324)	2-3 features/literal or text explicit 1+ feature/external knowledge (text implicit)	2-3 features/literal or text explicit 1+ feature/external knowledge (text implicit)	2 operations
HARD (325+)	4+ features including text implicit	4+ features including text implicit	3+ operations
NO. SPECIFIC DETAILS (SPEs)	LENGTH OF MATERIAL READ FOR ANSWER	NUMBER OF DETAILS	EXTENT OF EMBEDDED INFORMATION
EASY (0-225)	Answer in 1st or 2nd paragraph	15 or fewer	1 feature/literal match, text explicit
MODERATE (226-324)	Answer in 3rd-6th paragraph	16-29	1-2 features/interpretative match text explicit and implicit
HARD (325+)	Answer beyond 6th paragraph	30 or more	2+ features/text implicit

DIRECTIONS:

1. Determine type of literacy: prose, document, or quantitative.
2. Score for each characteristic: type of information, number of categories, number of SPEs.
3. Average the three scores to determine final score.

TYPE OF INFORMATION _____

NO. CATEGORIES OF INFORMATION _____

NO. SPEs _____

FINAL RATING (average of three scores) _____

DEFINITIONS

1. Script-based knowledge: Knowledge in one's head
2. Text explicit: Information specifically stated or easily implied from stated facts
3. Text implicit: External information not stated, but needed for processing the information to execute a given task

TABLE 4
PROTYPE NAEP CROSSWALK

The three sub-scale ratings are averaged to determine final difficulty rating of easy, moderate, or hard.

Initial validation of this scaling method was determined informally, by having literacy SMEs independently rate sub-tasks of three literacy tasks (found in Appendix E):

- using a technician's manual to solve an electrical problem
- responding to requests for service in apartments
- using a daily job list.

Results of the independent ratings showed variations as seen in Table 5. Type of information was easiest to rate and there appeared to be table 5 here no variation among raters. However number of categories of information and number of SPEs varied considerably, particularly in the rating of steps 1.1-1.1.2 of Responding to Requests for Service in Apartments. Consequently, the final ratings for all sub-tasks varied (except for 1.2 of the Daily Job List).

C. CONCLUSIONS AND RECOMMENDATIONS

The current prototype is insufficient for reliable rating of maintenance worker sub-tasks and requires further development. Initial findings reveal that the crosswalk process is extremely complex and time consuming. Its development requires expertise in the application of complex concepts and definitions and its use involves time-consuming counts of feature matches and specific details. While the NAEP taxonomy appears to be relevant for analyzing workplace tasks, development of the process for scaling of workplace tasks will require a great deal more work.

Immediate recommendations include the funding of follow-on projects of literacy audits for the application of the NAEP taxonomy. This would include refining definitions and delineating workplace specific examples. Expansion of the scale would probably be necessary, particularly in the area of quantitative literacy involving the use and integration of multiple documents. For example, the competitive bid process is so complex as to require numerous steps integrating prose, document, and quantitative literacy. Scaling of the sub-tasks of that particular job tasks would be extremely time consuming.

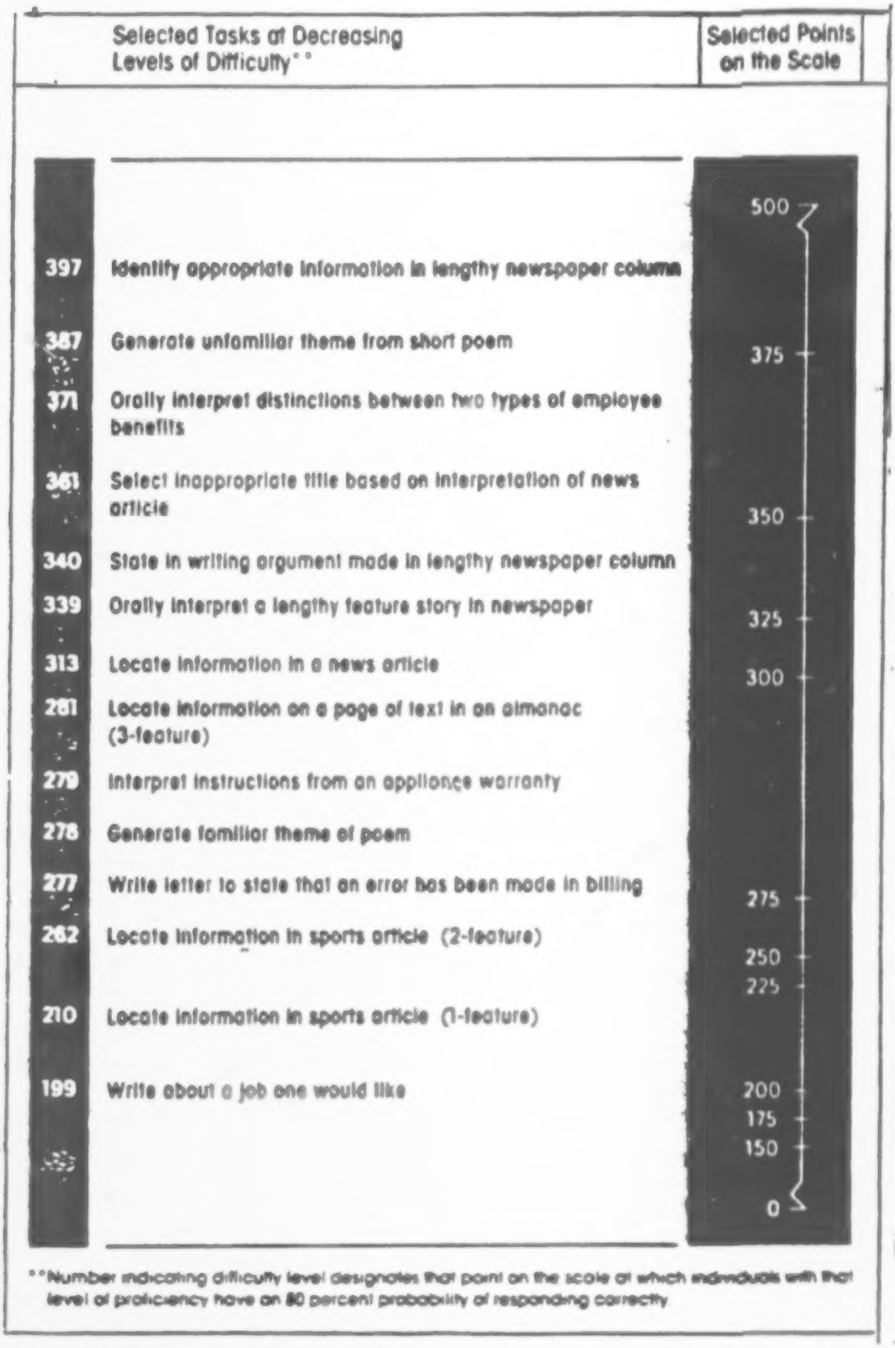
It would appear that the ultimate goal would be a simplified process that could be used by trainers and others for developing instructional materials and tests. Such an instrument could be used across occupations on a wide scale basis. It would mark the beginning of the standardization of workplace literacy audits and provide a foundation for developing the workplace training and testing programs so sorely needed.

LITERACY TASK	TYPE OF INFORMATION	NO. CATEGORIES OF INFORMATION	NO. SPEs	FINAL RATING
1. USING TECHNICIAN'S MANUAL TO SOLVE AN ELECTRICAL PROBLEM				
Steps 2.1-2.2.2	easy	easy-moderate	easy-moderate	easy-moderate
Steps 3.1-3.1.3	moderate	moderate-hard	moderate-hard	moderate-hard
Steps 3.2-4.1.2	hard	hard	moderate-hard	moderate-hard
2. RESPONDING TO REQUESTS FOR SERVICE IN APARTMENTS				
Steps 1.1.2	moderate	easy-moderate	easy-moderate	easy-moderate
Steps 8.1-8.1.4	easy	easy-moderate	easy-moderate	easy-moderate
Steps 1.1-1.1.2	hard	easy-hard	easy-hard	moderate-hard
3. DAILY JOB LIST				
Steps 1.2	easy	easy	easy	easy
Steps 2.1	moderate	easy-moderate	easy-moderate	easy-moderate

TABLE 5

RANGE OF RATINGS OF JOB TASKS DIFFICULTIES USING PROTOTYPE SCALE

NAEP PROSE LITERACY SCALE*



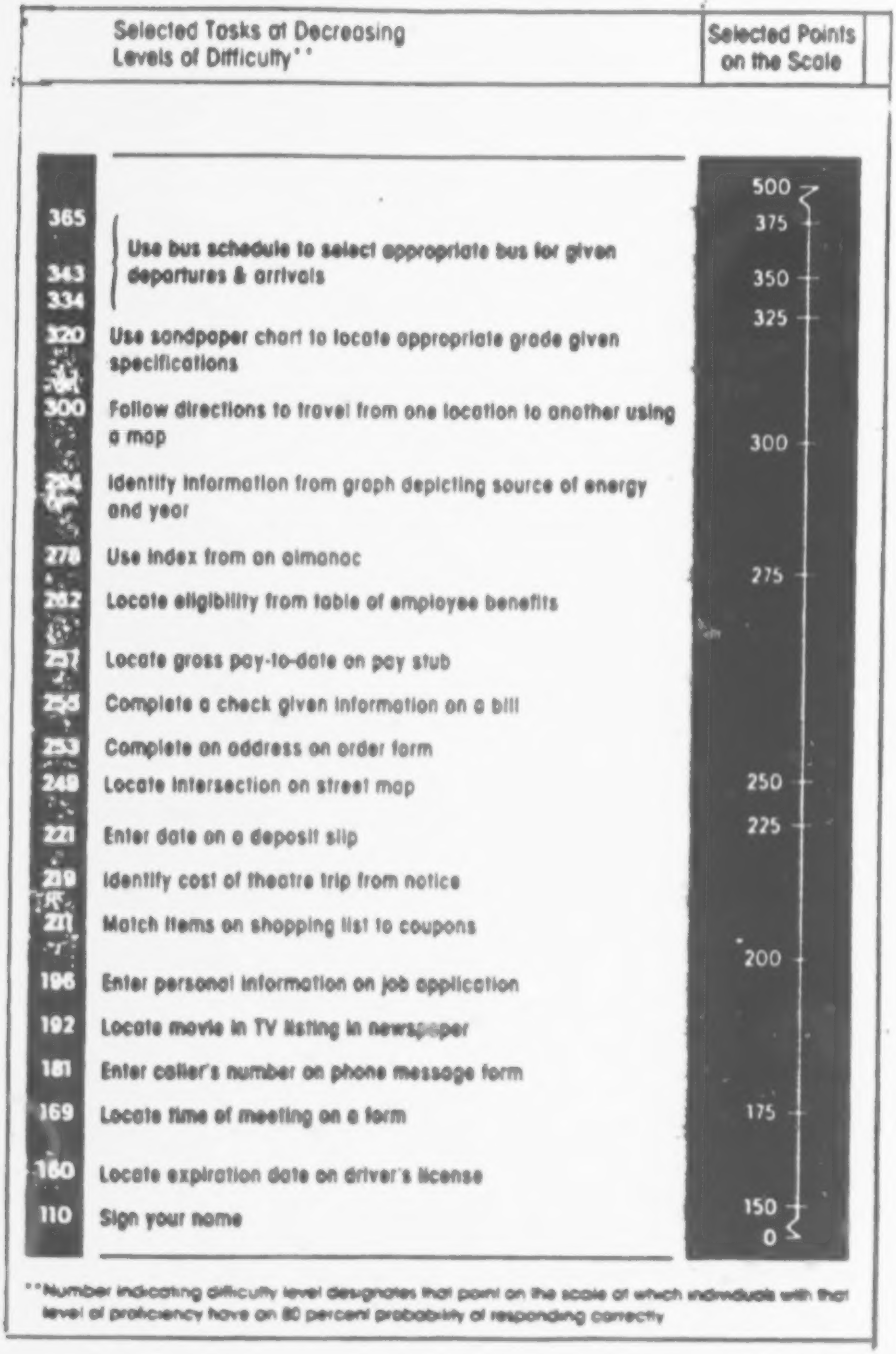
Selected Tasks at Decreasing Levels of Difficulty**	
397	Identify appropriate information in lengthy newspaper column
387	Generate unfamiliar theme from short poem
371	Orally interpret distinctions between two types of employee benefits
361	Select inappropriate title based on interpretation of news article
340	State in writing argument made in lengthy newspaper column
339	Orally interpret a lengthy feature story in newspaper
313	Locate information in a news article
281	Locate information on a page of text in an almanac (3-feature)
279	Interpret instructions from an appliance warranty
278	Generate familiar theme of poem
277	Write letter to state that an error has been made in billing
262	Locate information in sports article (2-feature)
210	Locate information in sports article (1-feature)
199	Write about a job one would like

Selected Points on the Scale

**Number indicating difficulty level designates that point on the scale at which individuals with that level of proficiency have an 80 percent probability of responding correctly.

*From Kirsch, I. and Jungeblut, A. Literacy: Profiles of Americas Young Adults. Educational Testing Service: Princeton, NJ, 1986.

NAEP DOCUMENT LITERACY SCALE*!



	Selected Tasks at Decreasing Levels of Difficulty**
365 343 334	Use bus schedule to select appropriate bus for given departures & arrivals
320	Use sandpaper chart to locate appropriate grade given specifications
300	Follow directions to travel from one location to another using a map
294	Identify information from graph depicting source of energy and year
278	Use index from an almanac
262	Locate eligibility from table of employee benefits
257	Locate gross pay-to-date on pay stub
255	Complete a check given information on a bill
253	Complete an address on order form
249	Locate intersection on street map
221	Enter date on a deposit slip
219	Identify cost of theatre trip from notice
211	Match items on shopping list to coupons
196	Enter personal information on job application
192	Locate movie in TV listing in newspaper
181	Enter caller's number on phone message form
169	Locate time of meeting on a form
160	Locate expiration date on driver's license
110	Sign your name

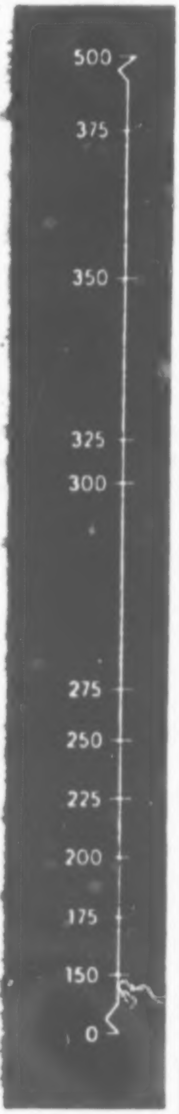
**Number indicating difficulty level designates that point on the scale at which individuals with that level of proficiency have an 80 percent probability of responding correctly

*From Kirsch, I. and Jungeblut, A. Literacy: Profiles of Americas Young Adults. Educational Testing Service: Princeton, NJ, 1986.

NAEP QUANTITATIVE LITERACY SCALE*

	Selected Tasks at Decreasing Levels of Difficulty**
489	Determine amount of interest charges from loan ad
376	Estimate cost using grocery unit-price labels
371	Calculate & total costs based on item costs from catalogue
356	Determine tip given percentage of bill
340	Plan travel arrangements for meeting using flight schedule
337	Determine correct change using menu
293	Enter & calculate checkbook balance
289	
281	
281	
233	Total bank deposit entry

Selected Points on the Scale



**Number indicating difficulty level designates that point on the scale at which individuals with that level of proficiency have an 80 percent probability of responding correctly

*From Kirsch, I. and Jungeblut, A. Literacy: Profiles of Americas Young Adults. Educational Testing Service: Princeton, NJ, 1986.

APPENDIX A

TYPICAL MAINTENANCE WORKER TASKS

Ranking
1 (not very)
2 (somewhat)
3 (very)

HOME BUILDERS INSTITUTE

BUILDING AND APARTMENT MAINTENANCE

CORE CURRICULUM

	CRITERIA				BASIC SKILLS						WORK MATER.
	Criticality	Frequency	Danger	Change	Oral Language	Listening	Reading	Writing	Math	Problem Solving	Work Materials
UNIT A - OVERVIEW: BUILDING & APARTMENT MAINTENANCE											
A-1 TRAINING GOALS											
1. To develop safe work habits on the job and know appropriate emergency procedures as necessary.											
2. To become familiar with the proper use and care of tools and equipment.											
3. To master basic skills in carpentry maintenance.											
4. To master basic skills in plumbing maintenance.											
5. To master basic skills in electrical maintenance.											
6. To master basic skills in painting maintenance.											
7. To master basic skills in masonry and tile maintenance.											
8. To master basic skills in appliance maintenance.											
9. To master basic skills in heating and air conditioning maintenance.											
10. To master basic skills in grounds maintenance.											
11. To develop a personal employability plan.											
UNIT B - EQUIPMENT, TOOLS & MATERIALS											
B-1 GENERAL TOOLS AND EQUIPMENT											
1. Demonstrate the proper use of hand tools:											
a. measuring/marking tools											
b. testing tools											
c. striking/driving tools/fasteners											
d. cutting tools											
e. application/finishing tools											
2. Demonstrate the proper use of portable power tools.											
3. Demonstrate the proper use of chemicals and compounds used in various trades.											
4. Identify the appropriate tools, equipment and materials for specific jobs in the following trade areas:											
a. carpentry maintenance											
b. plumbing maintenance											
c. electrical maintenance											
d. painting maintenance											
e. masonry/tile maintenance											

	CRITERIA				BASIC SKILLS						WORK MAT.
	Criticality	Frequency	Dangers	Change	Oral Language	Listening	Reading	Writing	Math	Problem Slvg	
f. appliance maintenance											
g. HVAC maintenance											
h. grounds maintenance											
B-2 CARE AND MAINTENANCE OF TOOLS AND EQUIPMENT											
1. Demonstrate ability to check condition of hand and portable power tools.											
2. Demonstrate proper care and maintenance of hand and portable power tools.											
3. Demonstrate ability to properly handle and store chemicals and compounds.											
UNIT C - SAFETY											
C-1 GENERAL SAFETY ON THE JOB											
1. Identify potentially hazardous conditions associated with tools, equipment, chemicals, work areas, building and grounds areas.											
2. Take appropriate safety precautions and wear appropriate safety gear and equipment for all jobs.											
3. Follow specified safety procedures for selecting, setting up, and using ladders and scaffolding.											
4. Follow specified procedures for safe handling and storage of potentially hazardous chemicals and compounds, and combustible and flammable materials.											
5. Follow/perform appropriate emergency procedures as necessary.											
UNIT D - BASIC MATH IN BUILDING AND APARTMENT MAINTENANCE											
D-1 BASIC MATH OPERATIONS											
1. Demonstrate ability to use measuring tools accurately and to add, subtract, multiply and divide measurements.											
2. Demonstrate ability to perform mathematical operations using whole numbers, fractions and decimals.											
3. Demonstrate ability to convert measurements from one unit to another.											
4. Demonstrate ability to perform material takeoffs in:											
a. square feet/yards											
b. running feet/yards											
c. cubic feet/yards											

③

UNIT E - CARPENTRY MAINTENANCE

	CRITERIA				BASIC SKILLS						WORK MAT.
	Criticality	Frequency	Danger	Change	Oral Language	Listening	Reading	Writing	Math	Problem Solving	
E-1 DOORS AND DOOR HARDWARE											
1. Maintain/replace metal and wood doors.											
2. Maintain/replace locksets and related hardware, door closure devices and hinges.											
3. Maintain/replace door stops and holders.											
4. Maintain/replace panic bars and related hardware.											
5. Install peephole in wood door.											
E-2 TRIM AND MOLDINGS											
1. Remove/reinstall/repair wood and vinyl trim and molding.											
2. Cut and fit mitre, butt and lap joints.											
3. Cut and fit a coped unit.											
E-3 SCREENS AND WINDOW HARDWARE											
1. Repair/replace screens in metal and wood frames.											
2. Repair/replace locks in wood and metal frames.											
3. Repair/replace crank assemblies and operators, and pull/push hardware.											
E-4 PLASTER AND DRYWALL											
1. Repair cracks in plaster walls and in drywall.											
2. Repair small holes in plaster walls and in drywall.											
3. Repair large holes in drywall.											
E-5 WINDOW GLASS											
1. Remove broken glass and residue from window.											
2. Measure and cut glass and synthetics.											
3. Install glass and synthetics.											
4. Install/replace wall mirrors.											
E-6 WEATHERPROOFING											
1. Apply caulking.											
2. Apply weatherstripping.											
3. Apply thresholds.											
E-7 GUTTERS AND DOWNSPOUTS											
1. Clean/inspect gutters and downspouts.											
2. Replace gutters and downspouts.											
E-8 FLOOR SURFACES											
1. Maintain/repair floor tile and sheet goods surfaces.											
2. Maintain/repair wood surfaces.											
3. Maintain/repair carpeted surfaces.											
4. Maintain cement/concrete surfaces.											

	CRITERIA				BASIC SKILLS						WORK MAT.
	Criticality	Frequency	Danger	Change	Oral Language	Listening	Reading	Writing	Math	Problem Solving	
UNIT F - PLUMBING MAINTENANCE											
F-1 PIPES											
1. Cut and join:											
a. steel pipe, thread steel pipe											
b. copper pipe											
c. plastic pipe											
d. cast iron pipe											
e. various tubing.											
2. Install pipe wrap insulation.											
F-2 DRAINS											
1. Clean/replace drain traps.											
2. Clear drain stoppages with chemicals.											
3. Remove stoppages with hand auger and with power auger.											
F-3 FAUCETS											
1. Identify major faucet types and typical causes of leaks.											
2. Repair major types of faucets.											
3. Repair/replace sink stopper and pop-up assembly.											
4. Clean/replace aerators.											
F-4 WATER CLOSETS											
1. Replace closet flange and tank gaskets.											
2. Replace flush valves, ballcocks and floats.											
3. Replace tank lever, tank flapper, and stopper.											
4. Replace wax gasket under bowl.											
5. Repair noisy or running toilet.											
F-5 VALVES											
1. Identify defective valves.											
2. Repair/replace defective valves.											
F-6 WATER HEATERS											
1. Turn heater off and on safely.											
2. Clean burner and pilot assemblies of oil fired and gas water heaters.											
3. Check for gas leaks; replace thermocouple on gas water heater.											
4. Replace thermostat on electric water heater.											
5. Replace temperature and pressure relief valves.											
6. Flush water heaters.											

⑤

	CRITERIA				BASIC SKILLS						WORK MAT
	Criticality	Frequency	Danger	Change	Oral Language	Listening	Reading	Writing	Math	Problem Solving	
UNIT G - ELECTRICAL MAINTENANCE											
G-1 CIRCUITS											
1. Properly test a circuit to locate a short or an open segment.											
2. Repair and replace circuits:											
a. cut, splice joints											
b. tape joints											
c. use solderless connectors.											
3. Check/test operation of battery operated smoke detectors; install/replace battery operated smoke detectors.											
4. Mount/check fire extinguishers.											
G-2 POWER SUPPLY CORDS											
1. Repair/replace two-wire cord and plug.											
2. Repair/replace three-wire cord and plug.											
3. Repair/replace four-wire cord and plug.											
G-3 RECEPTACLES AND SWITCHES											
1. Replace single-pole, three-way, and four-way switches.											
2. Replace duplex convenience outlet.											
3. Replace 220/240 volt range/dryer outlet.											
4. Replace doorbell.											
G-4 FUSES AND CIRCUIT BREAKERS											
1. Check condition of fuses.											
2. Replace major types of fuses:											
a. cartridge fuse											
b. plug and fusetron fuse											
c. type "S" fuse											
3. Check/reset circuit breakers.											
G-5 FLUORESCENT TUBES, STARTERS, BALLASTS											
1. Replace single and double pin fluorescent tubes.											
2. Replace starters.											
3. Replace ballasts.											
G-6 EXTERIOR LIGHTING											
1. Check/repair/replace photo cells, timers.											
2. Replace lamps, ballasts.											

	CRITERIA				BASIC SKILLS						WOR MAT
	Criticality	Frequency	Danger	Change	Oral Language	Listening	Reading	Writing	Math	Problem Solving	
UNIT H - PAINTING MAINTENANCE											
H-1 APPLICATION TO SURFACES											
1. Explain difference between oil and latex based paints, brush types and cleaning solutions.											
2. Prepare new and pre-finished wood and wall surfaces for paint and finish.											
3. Paint/finish wood, wall and metal surfaces.											
4. Prepare and varnish wood surfaces.											
UNIT I - MASONRY AND TILE MAINTENANCE											
I-1 FOUNDATIONS											
1. Clean stains and residues from masonry.											
2. Mix mortar/concrete.											
3. Repair joints of brick and block structures.											
4. Repair cracks and holes in block and concrete structures.											
5. Repair concrete/asphalt surfaces.											
6. Prepare/paint masonry surfaces.											
I-2 TILE											
1. Reset/regrout ceramic tile.											
2. Caulk around bathroom fixtures.											
UNIT J - APPLIANCE MAINTENANCE											
J-1 GENERAL APPLIANCES											
1. Read/interpret manufacturer's manuals to diagnose/repair/maintain appliances.											
2. Contact appropriate service vendors for check and repair of appliances as necessary.											
3. Turn off/on/adjust pilot light on gas appliances.											
J-2 RANGES AND OVENS											
1. Service/replace gas and electric surface units.											
2. Service oven doors, lights and light switches.											
3. Clean/maintain ranges and ovens.											
J-3 RANGE HOODS											
1. Explain basic ducted and ductless range hood operation.											
2. Service range hood light, fan motor, fan and light switches.											
3. Clean/maintain range hoods.											
J-4 REFRIGERATORS AND FREEZERS											
1. Explain basic refrigerator and freezer operation.											
2. Clean/maintain coils.											
3. Replace rubber gaskets, door switch, jamb strips.											

	CRITERIA				BASIC SKILLS						Work MAT.
	Criticality	Frequency	Danger	Change	Oral Language	Listening	Reading	Writing	Math	Problem Solving	
J-5 GARBAGE DISPOSALS/DISHWASHERS											
1. Explain basic disposal operation.											
2. Clean/maintain disposal.											
3. Repair electrical power supply to disposal.											
4. Repair dishwasher and plumbing fittings to disposal.											
5. Service jammed/noisy/stalled disposal.											
6. Remove/reinstall disposal.											
7. Service dishwasher.											
UNIT K - HEATING, VENTILATION, AND AIR CONDITIONING MAINTENANCE											
K-1 BASIC HEATING SYSTEMS											
1. Recognize individual/central units.											
2. Explain basic operation of forced, warm air, gas fired system and identify major components.											
3. Explain basic operation of convection, hot water, oil fired system and identify major components.											
4. Recognize electric/heat pump/active, passive solar systems.											
K-2 FORCED, WARM AIR, GAS FIRED HEATING SYSTEMS											
1. Clean/lubricate system components.											
2. Check/replace air filters.											
3. Check/adjust/replace wall thermostats.											
K-3 CONVECTION, HOT WATER, OIL FIRED HEATING SYSTEMS											
1. Clean/lubricate system components.											
2. Check/adjust/replace thermostats.											
K-4 BASIC COOLING SYSTEMS											
1. Identify window/central cooling systems and describe basic operation of each.											
2. Identify major components of window/central cooling systems.											
K-5 WINDOW AIR CONDITIONING UNITS											
1. Clean/lubricate unit; check air flow across components.											
2. Troubleshoot leaky/noisy unit; identify possible causes of problem.											
3. Check/replace capacitors, circulation fan motor, thermostatic control, overload protector, start relay.											
4. Summerize/winterize unit.											
5. Recognize when to contact service specialists.											

	CRITERIA				BASIC SKILLS						WORK MAT.
	Criticality	Frequency	Danger	Change	Oral Language	Listening	Reading	Writing	Math	Problem Solving	
UNIT L - GROUNDS MAINTENANCE											
L-1 LAWN AREAS											
1. Mow/trim/edge lawns; maintain lawn mowers.											
2. Lay sod/sow grass seed.											
3. Apply fertilizers and weed control chemicals.											
4. Prune/trim/maintain trees and shrubs.											
5. Plant trees and shrubs.											
6. Spray tree pest control chemicals.											
7. Cultivate/aerate/mulch soil around trees and shrubs.											
8. Maintain lawn areas (rake leaves, water).											
L-2 WATERING SYSTEMS											
1. Maintain hoses/accessories.											
2. Maintain permanent sprinkler systems.											
UNIT M - MISCELLANEOUS											
1. Install/replace fencing.											
2. Install/repair metal, wood shelving, cabinets.											
3. Install/replace medicine cabinets.											
4. Install/repair stair treads.											
5. Clear/clean storm drains.											

BUILDING & APARTMENT MAINTENANCE	CRITERIA				BASIC SKILLS						WORK MATERIALS
	Criticality	Frequency	Danger	Change	Oral Language	Listening	Reading	Writing	Math	Problem Solving	
SUPPLEMENTARY UNITS											
UNIT D - BASIC MATH											
1. Demonstrate ability to perform mathematical operations using ratio, proportion and percent.											
2. Demonstrate ability to use the metric system of measurement.											
3. Demonstrate ability to measure the surface of irregular figures and to measure volume.											
UNIT E - CARPENTRY MAINTENANCE											
1. Repair/replace steps/handrails/banisters.											
2. Install storage closet and hardware.											
3. Repair/install awnings.											
4. Install metal/wood/fabric window blinds and related hardware.											
5. Install glass doors around tub/shower.											
6. Adjust rooftop TV antenna.											
UNIT F - PLUMBING MAINTENANCE											
1. Replace fixtures.											
a. faucet assembly											
b. lavatory											
c. water closet											
2. Turn water off/on at main cut-off valve.											
3. Install/replace laundry tub.											
UNIT G - ELECTRICAL MAINTENANCE											
1. Install/replace interior lighting fixtures.											
2. Install/replace exterior lighting fixtures.											
3. Install telephone jack.											
4. Install rooftop TV antenna.											
5. Install/wire kitchen, bathroom exhaust fans.											
UNIT H - PAINTING MAINTENANCE											
1. Paint parking lot markings, fire lane markings.											
2. Paint signs.											

	CRITERIA				BASIC SKILLS						WORK MATERIALS
	Criticality	Frequency	Danger	Change	Oral Language	Listening	Reading	Writing	Math	Problem Solving	
UNIT I - MASONRY AND TILE MAINTENANCE											
1. Repair broken masonry steps, sidewalks, patios.											
2. Apply waterproofing to foundation/basement surfaces (interior/exterior).											
UNIT J - APPLIANCE MAINTENANCE											
1. Repair/service washer/dryer.											
UNIT K - HEATING AND AIR CONDITIONING MAINTENANCE											
1. Perform leak check on central air conditioning system.											
2. Troubleshoot central air conditioning system.											
UNIT L - GROUNDS MAINTENANCE											
1. Install/repair playground equipment.											
2. Repair/maintain trash areas.											
3. Install permanent sprinkler system.											
UNIT M - SNOW REMOVAL											
1. Remove snow/slush with snow shovel.											
2. Remove snow with snow blower or plow.											
3. Remove ice with ice chippers/scraper.											
4. Prevent slip hazards with salt, sand, cinder, calcium pellets.											
UNIT N - SWIMMING POOL											
1. Identify basic components/explain basic operation of water treatment/filtration/pool heater systems.											
2. Clean walls/floor of pool.											
3. Test/balance PH/chlorine levels of water.											
4. Add germicides to water.											
5. Backwash/clean filter and filtration system.											
6. Prepare/start up pool and filtration system for summer use/winterize and shut down system.											
7. Identify/correct pool hazards, unsafe conditions.											
UNIT O - BUILDING SAFETY AND SECURITY											
1. Maintain signs/exit lights/emergency lighting systems.											
2. Check security alarm system.											
3. Check/maintain emergency exit floor plans.											
4. Locate/maintain electrical/plumbing shut offs.											
5. Identify/correct electrical hazards.											
6. Check/maintain fire fighting equipment.											

⑪

	CRITERIA				BASIC SKILLS						WORK MATERIALS
	Criticality	Frequency	Danger	Change	Oral Language	Listening	Reading	Writing	Math	Problem Solving	
UNIT P - VEHICLE MAINTENANCE											
P-1 PREVENTIVE MAINTENANCE											
1. Check vehicle oil/water level, grease/change oil regularly											
2. Check tire inflation on all vehicles regularly.											
3. Clean/oil/drain gasoline powered lawn equipment.											
4. Clean/oil/drain gasoline powered snow equipment.											
UNIT Q - INSPECTIONS											
1. Conduct energy inspections to check:											
a. water leaks in kitchen, bathroom, laundry.											
b. water/electric meters.											
c. air leaks through windows, doors.											
2. Conduct safety inspections.											
3. Conduct maintenance/building/grounds inspections.											
4. Conduct move out/move-in inspections.											

APPENDIX B

SUPERVISOR MAIL SURVEY

Dear Maintenance Superintendent/Supervisor,

Interactive Training Incorporated (ITI) is collecting information about maintenance technicians for the Department of Labor. The purpose of the study is to describe the listening, speaking, reading, and writing skills involved in some of the work that maintenance persons do. The information will be used by instructors to assist in planning future training programs.

The Glick Corporation and other property management firms are working with ITI to collect the information. All of the Glick maintenance supervisors are being asked to complete the Supervisor Information Sheets. Your input is valuable to us. Please take your time and be sure to complete all information carefully. (You may do this on company time.) All information will be reported for a whole group. Your answers will not be linked to your name, the name of the property, or the name of your company.

To participate, please fill in all of the information on the attached information sheets. Read the directions carefully. Should you have any questions, do not hesitate to contact Patricia Gold at 703/824-2048.

Thank you for your cooperation.

Sincerely,

Name
Company

SUPERVISOR/SUPERINTENDENT INFORMATION SHEETS

Jobs sometimes take skills in reading, writing math, and being a good listener. This survey is to find out which skills are sometimes needed to do the job of maintenance person.

You will find a list of some of the jobs maintenance persons do in different parts of the country. Please read each job listed and rate the jobs:

1 = NOT TRUE 2 = SOMEWHAT TRUE 3 = VERY TRUE

- The job often requires reading, writing or math. For example, reading labels, following written directions, or doing paperwork.
- The job often requires speaking or listening. For example, listening to directions or asking questions.
- The job is important in terms of safety, angry residents or lost money if the job is done wrong.
- The ordinary maintenance person does this job often.

This information will be used to help train new workers.

Someone may visit or call you to ask more about some of these jobs.

COMPLETE THE FOLLOWING AND RETURN WITH THE INFORMATION SHEETS ATTACHED

I understand that my participation is voluntary and that this information will be held in confidence.

Your Name________________________

Company Name______________ Telephone________

Address____________________________

City______________State________Zip______

Total years as maintenance superintendent/supervisor 10

Total years as maintenance person 3

Number of maintenance persons you now supervise 20

With you and your property manager's okay, would your maintenance persons be willing to answer some questions about their jobs for one hour each:

On-site	✓ yes	___ no
By telephone	✓ yes	___ no

RETURN THE SURVEY IN THE SELF ADDRESSED STAMPED ENVELOP BY FEB 15TH.

SUPERVISOR INFORMATION SHEETS

DIRECTIONS: For each of the tasks below, please use the following ranking code:

1=NOT TRUE 2=SOMEWHAT TRUE 3=VERY TRUE

SAMPLE	Takes reading, writing, math	Takes speaking and listening	Important for safety, residents, lost $	Must do often
Carpentry				
1 Remove/install window glass	1 3	1 2	1 3	1 1
2 Maintain/replace door closures/hinges	2 2	2 1	2 3	2 3
3 Repair plaster/drywall holes	3 1	3 1	3 2	3 3

SURVEY TASKS 1=NOT TRUE 2=SOMEWHAT TRUE 3=VERY TRUE

	Takes reading, writing, math	Takes speaking and listening	Important for safety, residents, lost $	Must do often
General Operation on the Job				
1 Follow schedule prepared by supervisor	1 3	1 3	1 2	1 3
2 Complete work orders	2 3	2 3	2 3	2 3
3 Report potential problems to supervisor promptly	3 3	3 3	3 3	3 3
4 Train new workers on-the-job	4 3	4 3	4 3	4 3
5 Develop work schedule	5 3	5 3	5 2	5 2
6 Order equipment and materials	6 3	6 3	6 3	6 3
7 Contract out for work	7 3	7 3	7 2	7 3
8 Communicate appropriately with workers and residents	8 1	8 3	8 3	8 3
General Safety on the Job				
1 Identify/report potentially hazardous conditions associated with tools, equipment, chemicals, work areas, building and ground areas	1 3	1 3	1 3	1 3
2 Take appropriate safety precautions and wear safety gear and equipment for all jobs	2 3	2 2	2 2	2 2
3 Check and maintain hand and portable hand tools	3 3	3 3	3 3	3 3
4 Properly handle/store hazardous chemicals and compounds	4 3	4 3	4 3	4 3
5 Safely set up and use ladders and scaffolding	5 3	5 2	5 2	5 2
6 Perform appropriate emergency procedures as necessary	6 3	6 3	6 3	6 3
Carpentry				
1 Remove/install window glass	1 2	1 2	1 3	1 1
2 Maintain/replace door closures/hinges	2 2	2 2	2 3	2 1
3 Repair plaster/drywall holes	3 2	3 2	3 2	3 1

1=NOT TRUE 2=SOMEWHAT TRUE 3=VERY TRUE

	Takes reading, writing, math	Takes speaking and listening	Important for safety, residents, lost $	Must do often
Plumbing				
1 Cut/join copper pipes	1 2	1 2	1 3	1 1
2 Clear drainage stoppages with chemicals or auger	2 3	2 3	2 3	2 2
3 Clean/repair/replace faucets	3 2	3 2	3 3	3 2
4 Clean/check for gas leaks/replace thermostate/valves of water heaters	4 2	4 2	4 3	4 2
5 Turn on/off main water valve	5 2	5 2	5 2	5 1
6 Replace faucet assembly/lavatory/ water closet	6 2	6 2	6 2	6 1
Electrical				
1 Test/repair circuits	1 2	1 2	1 3	1 1
2 Check/test smoke detectors/ fire extinguishers	2 2	2 1	2 3	2 2
3 Replace receptacles and switches	3 2	3 1	3 2	3 2
4 Check/reset circuit breakers	4 2	4 2	4 2	4 2
5 Replace pins/starters/ ballasts of flourescent lights	5 2	5 2	5 2	5 2
Masonry				
1 Caulk around bathroom fixtures	1 1	1 1	1 2	1 1
General Applicances				
1 Turn on/off pilot light	1 2	1 2	1 3	1 2
2 Contact vendors for repair	2 3	2 3	2 2	2 2
3 Maintain surface units/doors/lights/ switches of ranges/ovens	3 2	3 2	3 3	3 3
4 Maintain light/fan motor/switches of range hoods	4 2	4 2	4 2	4 3
5 Maintain coils/replace gaskets/switches/ jamb strips of refrigerators/freezers	5 2	5 2	5 2	5 3
6 Fix/remove/install garbage disposals	6 2	6 2	6 2	6 2
Heating/Ventilation/Air Conditioning				
1 Know heating systems/concepts	1 3	1	1 3	1 3
2 Know cooling systems/concepts	2 3	2	2 3	2 3
3 Clean/lubricate/troubleshoot/repair/ window AC units	3 2	3	3 2	3 2
Grounds				
1 Apply fertilizer/weed control/ pest control	1 2	1	1 2	1 2
Vehicle Maintenance				
1 Check/maintain vehicle oil/water/ grease/tire inflation	1 2	1	1 2	1 2

1=NOT TRUE 2=SOMEWHAT TRUE 3=VERY TRUE

	Takes reading, writing, math	Takes speaking and listening	Important for safety, residents, lost $	Must do often
Building Safety/Security				
1 Maintain signs/exit lights/ emergency lights	1 3	1 3	1 3	1 3
2 Check security alarm system	2 3	2 3	2 3	2 3
3 Locate/maintain electrical/ plumbing shut offs	3 3	3 3	3 3	3 3
4 Identify/correct electrical hazards	4 3	4 3	4 3	4 3
5 Check/maintain fire fighting equipment	5 3	5 3	5 3	5 3
Inspections				
1 Energy conservation--water leaks kitchen/bathroom/laundry/elec.meters	1 3	1 3	1 3	1 3
2 Safety hazards	2 3	2 3	2 3	2 3
3 Building maintenance	3 3	3 3	3 3	3 3
4 Grounds maintenance	4 2	4 2	4 2	4 2
5 Move in/move out conditions	5 3	5 3	5 3	5 3
Snow Removal				
1 Remove snow and ice	1 2	1 3	1 3	1 2
2 Use materials to reduce slip hazards	2 2	2 2	2 3	2 2
Swimming Pool				
1 Use chemicals for hygiene/chlorine level	1 N	1 N	1 N	1 N
2 Maintain filtration system	2 N	2 N	2 N	2 N
3 Startup/winterize filtration system	3 N	3 N	3 N	3 N
4 Identify/correct pool hazards/ unsafe conditions	4 N	4 N	4 N	4 N

DIRECTIONS: Briefly list the following information.

List (2) jobs that require reading or math and can be dangerous if done wrong.

1. ELECTRICAL
2. CHEMICAL

List (2) jobs that require reading or math and can take a lot of money and time to redo if done wrong.

1. PLUMBING
2. CARPENTRY.

List (2) jobs that require reading or math and you need to do well to be promoted.

1. INVENTORY / CONTROL
2. SUPPLY / MATERIALS

APPENDIX C

TELEPHONE INTERVIEW

Part I: Demographic Information **Interview # 1**

A. Interviewee

Name:
Position: Superintendent
Years at present job: 15 mos at NHP

Yrs. exp. in maintenance: 6 yrs
Responded to mail survey: _______ Yes ___x___ No

B. Site Complex Description

Site name and address:

Phone #:

Management company: NHP
Region: 8
Number of units: 200 (largest NHP site in Colorado)
Number of maintenance personnel & rank: 3 full time maintenance assistants & 1 summer grounds keeper

Subsidized (section 8) __X__ Yes ______ NO
Housing type: [✓ Regular]/Low income/Elderly/Handicapped
Age of complex: 18 yrs
Union? ______ Yes ___x___ No

Does your complex have any of the following:

__n__ townhouses
__n__ pool
__n__ AC (type ______________________)
__y__ heat (type __gas furnace__________________)
__3__ play areas
__y__ common areas
    __n__ clubhouse
    __n__ exercise room
    __n__ lockers
    __n__ sauna
    __n__ hallways
    __3__ laundry
__n__ elevators
__n__ garages
__15 acres__ grounds

Part II: General Questions

1. List 2 jobs that require reading or math and can be dangerous if done wrong:

Electrical --

1. Install plug on a 220 stove;
2. Changing out a breaker -- if don't turn off the right electric source they are in big trouble. Must read breaker box to tell which switch to turn off.

2. List 2 jobs that require reading or math and can take a lot of money and time to redo if done wrong.

1. Sprinklers -- There are 4 timer boxes with a multiple number of zones (8, 9, 6, 11 zones). Workers must read the boxes to determine how to set the timers correctly. Is very time consuming to do initially and would be very time consuming if have to reset if done incorrectly the first time.

(Interviewee could not think of a second job.)

3. List 2 jobs that require reading or math and you need to do well to be promoted.

The superintendent did not understand the question, nor could he seem to identify skills he had that had made him promotable to his new position as superintendent. Instead he noted qualities that someone should have:

> Willing to learn
> come to work everyday
> ask a lot of questions
> ask to be taught new things

Part III: Document Literacy Tasks

List of forms used during an average month:

work order forms (filled out by rental office)
Custodian sheets -- checked every week, watering, picking up litter, cleaning gutters, snow removal (a specific kind of work order

Budgeting forms -- annual expenses for trash removal, grass, snow removal, monthly
Scheduling forms -- managing the maintenance assistance schedules; manage the turnover schedules. (Mountain Knolls is the largest NHP property in Colorado and they have the highest turnover because they are very near Fort Carson. GI's are constantly moving in and out.
move in/move out forms

"Green Sheet", what was spent each week, done every Monday morning, records number of hours spent working on turnovers, how many hours spent on that week's work orders;

Preventative Maintenance forms, weekly

subcontracting forms for resurfacing counter tops, make decision with rental manager about which apartments need resurfacing, compare with several companies

Which are most difficult and why?

Budget because you have to keep it down; must try to do as much here as possible to keep the amount of subcontracting at a minimum. For example, we do our own roofing. Maintenance Superintendent gets bonus when under budget.

Describe the reading, writing and math involved in each of the most difficult tasks above.

Subtracting what is spent from what is allowed for the month. Go through the records, keep receipts and total them up, and read the bids and the amounts and total them up. Compare with the budget figures and maintain a balance.

Part IV: Chemicals

What are the most dangerous chemicals you use?

ZEP oven cleaner. We had complaints that it was too strong; workers were getting burned by it. We just quit using it recently.

Which of the chemicals you use involve mixing or spray equipment?

none; all grounds fertilization is subcontracted; all insect spraying is subcontracted

What are the 5 most commonly used chemicals used at your site?

Wood doctor for cabinets
oven cleaner
Tub and tile powder
ZEP-Out carpet cleaner
Stainless steel Cleanser

What kinds of reading are involved in using chemicals?

On oven cleaner, read caution for rubber gloves. Workers do read the label on oven cleaner. But we've been using it for a long time and so they already know about it.

Do you read the labels of chemicals containers? How often?

Supervisor said the workers are "pretty good about" reading the labeling on new product. He said he recently asked to try a new hand cleaner product from their supplier. When it arrived, one of the maintenance workers read the package labeling and noticed before using the cleaner that it was actually a cleaner for washing cars.

Why or why not? Did you read them when you were new to the job?

Are you familiar with MSDS forms? Is there a procedure at your company for receiving, filing, making available MSDSs? Have you ever read one? Why do you read them?

Superintendent is familiar with MSDS's but says they "don't need them." Seemed nervous about the line of questioning. MSDS's are kept in a filing cabinet in his office. When new ones come in, superintendent reads and then circulates to workers. When a new chemical product comes in, he reads the MSDS to be sure of it's application and that it is appropriate for the job. There is no other reason workers would ever read the MSDS.

Part V: Subcontracting

What routine services/maintenance/repairs do you subcontract at your site?

Windows -- contractors cut and deliver and we install;
Lawn is subcontracted (mowing)
Snow removal
pavement of parking lot
sidewalk (concrete work)
Landscaping (islands, shrubs)

Why do you subcontract for these services? (Why don't you perform these services yourself?)

We don't have the machinery needed for pavement. The other things are subcontracted because they are specialized services. We contract with people who are expert in making windows, or pouring concrete, etc.

We have such high turnover, especially in the summer that there is no time to do some things, like mowing. We have 15 acres to maintain and we can't keep up with it in the summer.

Have you ever performed any of these services at your site? Do you have any personal experience performing any of these services?

Do you have any personal experience performing any of these services?

Sometimes we will patch up sidewalks if the repair is needed quickly, but usually we rely on a specialist to do the work.

What other types of subcontractors do you use in emergencies?

Sewer cleaning -- once every two months
Water heater -- every two months. They are all 16 to 17 years old and they "rot out;" We have them replaced.

Part VI: Instructions, Schematics, Maps and Blueprints

How often do you use instructions or diagrams when installing, servicing, or repairing items? (e.g., appliances, air conditioners, furnaces).

Most instructions aren't useful because you get experienced and can do things. Most people are experienced.

What kinds of instructions or diagrams do you use?
Why do you use them?

We do use them with ceiling fans -- must look at the wiring diagram to install; Even the experienced must use the diagram because they can't always remember the right way.

Stove controls; changing switches on stoves and the bake element. Must read the instructions and schematic on the stove to insure proper wiring;

Electric Photo cells on outside of the building that turn the lights on and off. Must read wiring schematic to determine, leads, common, hot, ground, etc.

"Pig tails" on stoves -- terminal blocks; 220 plugs on stoves, sometimes the internal block will short out and you must read the schematic on the block to determine, lead, ground, hot, common

Did you use instructions or diagrams when you first learned how to do various installation and repair tasks?

Yes

Why don't you use instructions or diagrams when performing maintenance tasks?

Most of the time I know what to do from experience and the instructions slow me down.

How often do you use blueprints of the apartment complex?

Fairly often in the summer for the sprinklers to find where the broken lines are;

What kinds of tasks do you use them for?
How helpful are they?

Each year we blow out the water lines and look at blueprints to find where they are broken;

Gas lines, water lines;
Very helpful;
Sewer department recently gave us their blueprints to help us tell where the lines are running from our buildings.

How often do you use maps of the apartment complex?

Not much, you get the hang of it. New people get a map that they carry with them until they get they learn their way around.

What kinds of tasks do you use them for?

They are useful when talking with sub-contractors to show where repairs need to be done.

How helpful are they?

Very helpful in the beginning.

Part VII: Heating and Air

What kind of reading (instructions, diagrams, parts numbers, packaging/labels, meters/measuring devices, keeping records) is involved in each of the following maintenance tasks?

> Air conditioning servicing and repairs (no AC)
> furnace servicing and repairs

Gas furnaces for changing gas valves, electrical diagrams for telling which thermostat wires when rewiring, wiring fans

Installing transformers -- trying to wire it right

read fuse box panel -- to see what amperage fuse is used

What kind of math/computation is involved in each of the above tasks?

None involved.

Part VIII: Training

What kind of training is offered through the apartment management company? What kind of training is offered before being hired for the job?

Recent classes at Denver for NHP on Boilers.

What kind of training is offered by the union?

No Union

What kind of additional training, if any, would you like your maintenance workers to obtain?

Patching sheetrock
Electrical -- how to change a breaker on a big electrical box -- superintendent does now. No reading involved, just make sure the power is off. Take off wires and replace.

Part IX: Distribution of Work Tasks:

Are there any maintenance tasks that you now perform that you would like your maintenance workers to help perform?

replace breakers
sprinkler operations and maintenance -- time clocks, valves, zones

Which of these tasks involve reading or math?

Reading the time clocks, what time, what zone, manual of time box; instructions on the box; how to turn on manually and how to turn off; must be able to read to select the proper zone

Breakers: see which apartment you are going to work on so you turn of the electricity in the one you are going to work on.

Does the level of your workers' reading and math skills prevent you from assigning them certain tasks?

sometimes; But generally they are willing to learn. [Super was reluctant to be critical of assistants in any way.]

Which tasks does the rental office perform that you would rather perform yourself?

None really. Work with the manager about when to put new carpet, but generally we run separately, we're on our own. [Appeared to have a good relationship with the rental office and seemed that the maintenance operations were fairly autonomous from the rental office.

Do any of these tasks involve reading or math?

APPENDIX D

SITE DATA

. . Site visit Summary

Name/Address/Phone	Subjects	Tasks Analyzed	Tasks Noted	General comments
	Superintendent Assistant, 6 mos here 1 yr prev. exp grnds keeping w/ other co.	●Recertification inspection ●responding to Service Requests ●Red Tag ●Map reading ●daily job list	CHEMICAL LABELS ●Ice melt ●Wasp Away ●Hornet Spray ●Toilet Bowl Cleaner ●Cleaning solvents ●Project maint. time card	Primary literacy tasks at this site were handled mostly by the superintendent. Maybe because this assistant was new, but appeared that responsibility wasn't being delegated. Super expressed desire to have assistant doing more (e.g., bid packages), but didn't feel that at this time he could entrust more difficult tasks to Asst. Poor map reading skills. Moderate emphasis on reading in performance of job tasks.
	Super., 9 yrs exp. Assistant, 9 yrs. exp.	PURCHASING ●Purchase request ●Purchase Order MAINT. MANUAL ●Buyers guide ●Vendor list ●Inventory Price list ●Rolodex SUMMER/ WINTERIZATION ●Balcony inspct frm ●Checklist ●filter/smoke alarm log	●manual updating ●Blueprints CHEMICAL LABELS ●Johnson Wax Pride indust. oven cleaner. ●Emulsion Bowl clner ●Bolt Action pest.	Super at this site appeared to be low-literate (guestimate: 4 to 6th grade level), no high school degree and very hands-on oriented. Made obvious errors and misread much of the material he was showing us. Much of the work handled by supers at other sites was handled here by the rental manager. This is a rural community compared to Indianapolis. Small staff (1 full time assist. and 1 pt time grounds keeper). More work subcontracted here than at other sites (e.g., all grounds spraying). Little emphasis on reading skills in performance of job tasks.
	Superintendent Assistant, 3 mos here, but years prior exper.	●Blueprints/Electrical ●Blueprints/ landscaping	●multimeter (electrical) ●Plumbing schematics ●refrig. schematics ●AC schematics ●Floor buffer dir. CHEMICAL LABELS ●ice melt ●Swat III herb. ●Wax stripper ●bathroom clnr ●muriatic acid ●pressure gauges (ac/refrig)	Experienced super and assistant. Assistant very knowledgable re: electronics. Interestingly enough, it became apparent while the assist. was showing us how he read a blueprint that he didn't know that there was a symbol key or how to use it. Moderate emphasis on reading skills in performance of job tasks.

III Site visit Summary

Name/Address/Phone	Subjects	Tasks Analyzed	Tasks Noted	General comments
	Super, 9 mos here 5 yrs. prev exp. No assistants currently at this site	REQUEST FOR QUOTES (Multi-step process)	CHEMICAL LABELS ●Roundup herbicide ●Treflan Granular ●Par-X Granular fert POOL MAINT. ●Algicides ●rapid shock ●soda ash ●muriatic acid ●measuring wheel ●compet. bid form ●Eval of quotes ●pool log	Exceptionally competent supervisor. No assistants currently. Much of what would have been good to task analyze was not available at this time (e.g., pool chemicals and herbicides). Also, although we documented the process of competive bids and quote evaluation, we were not permitted to have completed forms due to their proprietary nature. This site had an unusual division of labor: 1 super handled all inside work, while another did only outside maintenance. They covered 3 complexes. Supervisor mentioned his inadequate typing skills. High emphasis on literacy skills in performance of job tasks.

Site visit Summary

Name/Address/Phone	Subjects	Tasks Analyzed	Tasks Noted	General comments
	Super, 6 yrs here prior industrial exp Assist 1 : 8 mos here 5 yrs. Air Force Assist 2 : 1.5 yrs here 2.5 yrs. with Glk Co	●Consult Tech. manual to determine problem with faulty 3 way electrical switch MOVE IN PROCEDURE ●Acknowledgement of Instructions ●Inspection Cert. /Permanent Damage List ●Maintenance Inspection Report ●Service Work Order (for work contracted to outside vendors) ●Maintenance Supers Checklist for Service work Orders over $1000	●voltage tester ●pool pH & chlorine testing ●measuring doors for replacement CHEMICAL LABELS ●calcium chloride for snow removal ●2 pool test kits ●Sonny Sol muriatic acid ●sodium carbonate for increasing pool pH ●Zepo Sector insect spray ●Tox-II ●chlorine tablets ●Tuff Stuff oven & grill cleaner ●all purpose Formula 50 cleaner	This site was different than any we visited in that the super was very competent and practiced the philosophy that each of his assistants should be as capable as he to do any of the tasks required. This attitude was echoed by each assistant and each appeared more confident and capable to handle the physical as well at the literacy tasks required in their job. Excellent to visit again for a variety of other tasks. Also have pool, but contract out maintenance. They have a company that provides life guards who handle pool chemical maintenance too. Very challenging maintenance environment because it is the 2nd oldest Glick property and there is little standarization of appliances, wiring, etc. Additionally, blueprints for the comples were lost in a fire soon after the building was built. This is a very rich reading material environment compared to other sites (e.g., there are lots of signs, notes, messages posted on the walls such as vendor service rates and information about sub-contractors). High degree of emphasis on literacy skills in performance of job tasks.

Site visit Summary

Name/Address/Phone	Subjects	Tasks Analyzed	Tasks Noted	General comments
	Super, 12 yrs exp.; Assistant 1, 1.5 yrs exp.; Assistant 2, 6 mos exp.	●Furnace repare: rewire fan switch using schematic ●Spraying herbicides ●cleaning clogged drains	●fire alarm system log ●Measuring replacement glass for windows ●spray paints ●tape measure to 1/8	Supervisor appeared low skilled and non-supportive of his assistants. He told us how little they were capable of doing. No support for reading or acknowledgement that reading would be important. Super uncooperative and unreceptive to the goals of the interviews; he subtly underminded our efforts by passively resisting our inquiries. Assistants were much more willing and cooperative and apparently more competent than super acknowledged. One assistant was young and ambitious and told us about his goals to become a superintendent. Still, very difficult to find task that involved reading or discover reading that was being done on the job. Little to no emphasis on literacy skills in performance of job tasks.

Report on Remote Site Visits

SUPER. NAME/COMPLEX NAME/ADDRESS/PHONE

COMPLEX'S FEATURES
- 1 maint. staff for both complexes
- ??? units
- @23 yrs. old
- Section 8, low-moderate income
- 2 pools
- central, chill water a.c. w/ air handlers in apts.
- substantial grounds

MAINTENANCE STAFF
- 1 super., 5 maint. workers, 2 porters
- several workers speak/read/write little Eng.

TASKS CATALOGED

Responding to a Corrective Maintenance Work Order
- "Corrective Maintenance Work Order"

Performing weekly preventive maintenance
- set of "Preventive Maintenance Work Orders"

Reporting maintenance activities weekly
- "Weekly Maintenance Summary"

Purchasing supplies, parts, appliances
- "Purchase Order"
- price lists kept in spiral notebook

Communicating with porters about extermination schedule
- "Extermination Schedule" (marked complex site plans)

Recording daily job tasks completed
- daily job task chart

Maintaining the a.c. chill water unit
- "Test Procedures for Chem Aqua 777"
- "Taylor Phosphonate Test Kit" instructions
- "Taylor Nitrite Drop Test Kit" instructions
- dissolved solids meter instructions

Inspecting apartment air handlers
- "A.C. Inspection Schedule" (marked complex site plans)

ADDITIONAL MATERIALS COLLECTED
- "North Lake Terrace Site Plan"
- "Northwest Terrace Site Plan"
- 6 apt. floor plans
- "Move-in/Move-out Checklist"
- "Turnovers" chart (drawing)
- payroll time sheet

- "Renwick Gardens Painting Schedule for 1989"
- "Carpet Installed Since June 1986"

CHEMICALS NOTED
- extensive use of ZEP Manuf. Co. products; no specific chemicals noted

GENERAL COMMENTS
- Super./Coord. is extremely competent (good maintenance, administrative and basic skills), takes considerable initiative in designing new systems, incl. new forms
- Observed instance when super./coord. adapted form inappropriately because original use was unclear
- Handyman's responsibilities include completion of various literacy tasks, esp. work orders
- Moderate emphasis on using reading materials in performance of maintenance tasks
- Extremely well-organized shop inventory, incl. elaborate labeling
- Super./coord. & handyman perform variety of carpentry, welding, & appliance repair tasks; numerous measuring tools in shop: straightedges; calipers; levels
- Relatively little subcontracting; subcontracted work: elevator maintenance; insect spraying; some carpentry & painting
- Super./Coord. extremely well-informed re MSDSs & OSHA requirements about use of hazardous chemicals, trains supers. at 20-25 complexes; assumes resp'y for acquiring & distributing MSDSs
- Very tense relationship between rental office & maint. staff, esp. regarding maint. budget

Site Visit Descriptions

SUPER. NAME/COMPLEX NAME/ADDRESS/PHONE

COMPLEX'S FEATURES

- 111 units
- older complex
- central boilers
- elevators
- garbage chutes & compactors
- little grounds
- no pool

MAINTENANCE STAFF

- 1 super., 1 handyman, 3 porters
- Super.: from Ecuador; in U.S. 20 yrs.; has GED; some training through Union; 7 yrs. at Riverview, previous maint. experience; good reading & writing in Eng., spoken Eng. sometimes unclear; seems bright, esp. math skills
- 1 porter speaks only Span.

TASKS CATALOGED

Responding to a "Corrective Maintenance Work Order"
- "Corrective Maintenance Work Order"

Completing move-out/move-in procedures
- "Vacant Apartment Preparation Check List"

Reporting inventory monthly
- "Inventory Control Sheet"

Reporting orders for supplies monthly
- "Supply Request Form"

Conducting recertification inspections
- "Dwelling Unit Inspection Report"

Ordering parts from the "Buyers Access Manual"
- "Buyers Access Manual": "Table of Contents;" "Faucet Repairs -- Section 1 -- Index;" descriptions of faucet washers; a price list

Advising resident of maintenance work performed on apartment
- green door tag

Calling a contractor
- "Contractors for Emergencies" form

ADDITIONAL MATERIALS COLLECTED

- installation instructions for Wood's Sure-Flex (boiler coupling sleeve)
- boiler schematic and specifications chart
- posted union info (3 examples of "Special Bulletins," incl. 1 in Span. & Eng.
- Super. notes re necessary maint. & repairs in common areas
- MSDS for a ZEP product, sample page

Report on Remote Site Visits

CHEMICALS NOTED

- ZEP Formula 50 (ZEP Manuf. Co., floor stripper)
- Prestige (Prestige Labs, garbage chute cleaner)
- Grease-B-Gone (State Chemical Co., garbage chute cleaner)
- Parko (Parke-Hill Chemical Co., boiler water treatment)
- Graff-Off (Bomar Industries Inc., graffiti remover)
- Shield (ZEP Manuf. Co., acrylic floor finish)
- Zepopine-8 (ZEP Manuf. Co., pine-scented floor cleaner)
- ZEP Time Saver (ZEP Manuf. Co., floor cleaner)
- Top Shield (Bomar Industries Inc., floor wax)
- Dura-Mastic (Construction Chemicals)
- Gar-Deo (Prestige Labs, garbage compactor cleaner)
- ZEP-O-Brite (ZEP Manuf. Co., cleanser)
- Shield (ZEP Manuf. Co., acrylic floor finish)
- ELC (electrical contact cleaner)
- Kill Mist (indoor insecticide)
- ECC (glass cleaner)
- ZEP Manuf. Co., stainless steel polish
- Bu-Mas-Co., baseboard cleaner & wax stripper
- Bu-Mas-Co., insecticide fogger
- Ceiling to Sewer (cleanser)
- Creative Chemicals, odor control granules
- Car Tox (East Coast Chemicals, cleanser)
- ammonia
- Chlorox bleach
- spray paint (misc.)
- paint (misc.)
- snow salt (no name)

GENERAL COMMENTS

- Little emphasis on use of print materials in performance of maint. tasks; super. expressed belief that good workers rarely need to read schematics or installation instructions; demonstrated ability to use such materials if necessary
- Considerable use of printed materials in performance of admin. tasks; super. has created own system for organizing vendor catalogs & price lists in a notebook--simplifies ordering parts & supplies
- Communication w/porters is minimized by having them perform same tasks each week
- Subcontracted work at site: water heater repairs; elevator maintenance; plumbing; indoor insect spraying
- Elevator maintenance entails no literacy skills beyond calling subcontractor
- Extensive use of chemicals; ZEP Formula 50 considered most hazardous, requires mixing; chemical storage area potentially dangerous--fumes & spilled chemicals on floor; porter suffered burn from chemical splash, chemical no longer used; very little use of literacy skills in chemical storage & application, though many materials available

Report on Remote Site Visits

SUPER. NAME/COMPLEX NAME/ADDRESS/PHONE

COMPLEX'S FEATURES

- 224 units, 13 floors
- several years old
- elderly & handicapped Section 8
- central boilers
- individual window a.c. units
- elevators
- extensive common areas
- sophisticated alarm system
- park-like area on grounds

MAINTENANCE STAFF

- 1 super., 1 handyman, several porters
- Super.: also serves as Maint. Coordinator, supervising 20-25 superintendents in NYC; from Ecuador; 10 yrs. as a maint. super.; certified Building Maintenance Mechanic (training provided by Dept. of Labor through union (SEIU (AFL-CIO), Local 32B-32J)

TASKS CATALOGED

Responding to a Corrective Maintenance Work Order
- "Corrective Maintenance Work Order"

Completing Move-out/Move-in procedures
- "Vacant Apartment Preparation Check List"

Reporting inventory monthly
- "Inventory Control Sheet"

Reporting orders for supplies monthly
- "Supply Request Form"

Performing weekly preventive maintenance
- set of "Preventive Maintenance Work Orders"

Reporting maintenance activities weekly
- "Weekly Maintenance Summary"

Training through Hazard Communication Program
- "OSHA - Administracion de Salud y Seguridad de los Estados Unidos" translated document
- "Hazard Communication Program Training Report"

ADDITIONAL MATERIALS COLLECTED

- trouble system alarm panel (photo)
- schematics & installation instructions: Delta faucet; Tub/Shower Mon-O-Mixer; switch wiring diagram; electric range; electric wall oven; Best top & cover kit
- "Maintenance Skills Checklist" (for employee evaluation) & cover sheet
- job descriptions: super.; handyman
- weekly job duties lists for 3 porters
- payroll forms
- "Exempt Personnel - Leave Form"
- "Cycle Painting Schedule"

Report on Remote Site Visits

CHEMICALS NOTED

- Sunis (refrigerator oil)
- Reach (ZEP Manuf. Co., cleanser)
- Shiny-side (Chemsearch, aluminum cleaner)
- Bio Cool 250 (a.c. chill water treatment)
- condensate tablets
- bleach blocks

GENERAL COMMENTS

- Spoke w/ super. & Carl Pafford, a district maint. coordinator, about maint. worker training needs; recommended training in: (1) schematic reading, (2) basic electrical, (3) refrigeration, (4) intro to gen'l appliance repairs, (5) plumbing, (6) basic blueprint use (7) managing paperwork; commented that training should be: (1) hands-on rather than just reading, using small, to-scale models; (2) designed by people who work in the field rather than professional trainers; commented that workers often are reluctant to pursue further education because usually must do on own time & pay for themselves
- Super. placed moderate emphasis on use of reading materials in performance of maint. tasks; stressed hands-on approach
- Super. & coord. noted that most workers don't read schematics because they can't, & that reading schematics could make employees more efficient & save money (e.g., dishwasher repair)
- Subcontracted work: cleaning, painting, plumbing, pool maintenance (all chosen by maint. super.); grounds keeping (district account); indoor insecticide spraying, carpet replacement (both national accounts)
- Super. has found creative ways to manage workers w/ poor Eng. skills (e.g., daily job task chart)

Report on Remote Site Visits

SUPER. NAME/COMPLEX NAME/ADDRESS/PHONE

COMPLEX'S FEATURES
- 490+ units
- 5 yrs. old
- individual furnaces & a.c. units
- 2 pools, 2 hot tubs, fountains
- clubhouse, exercise room, saunas, locker rooms
- extensive grounds
- fireplaces

MAINTENANCE STAFF
- 1 super ; 2 assistants (1 fulfills most service requests; 1 prepares apts. for new residents); 1 porter
- Super very new to job

TASKS CATALOGED
Conducting daily pool maintenance
- "Guardex Test Kit:" directions, acidity table, acidity color code chart, pH paper

Responding to a service request
- Service request form

ADDITIONAL MATERIALS COLLECTED
- Complex site plan
- 4 apt. floor plans

CHEMICALS NOTED
- Free Style (algicide)
- Calcium Hypochlorite Granular 65 (pool pH increaser)
- Muriatic acid (pool pH decreaser)
- Tri Chlor (chlorine tablets)
- Tri Chlor (pool shock chemical)
- Foam Free (hot tub foam reducer)
- Manforce Pharoah Ant Killer (insecticide)

GENERAL COMMENTS
- Super new to job and unable to articulate clearly his job duties; has almost no admin. or managerial responsibilities-- rental office directly supervises maintenance staff
- Maint. workers we met seemed moderately to not-at-all competent
- Rental manager identified following tasks now performed by rental office that could be performed by maint. staff: scheduling service requests; taking inventory; ordering supplies; contacting subcontractors
- Rental office issues maint. staff a weekly "Maintenance Challenge List," noting tasks it would like performed in addition to service requests & apt. turnovers
- Considerable tension between rental office & maintenance staff
- Very little use of print in performance of maintenance tasks (e.g., super. said schematics

never used)
- No formal procedures for: apt. turnovers; weekly maint. reports; preventive maint.; taking inventory
- Subcontracted work: grounds keeping; indoor insecticide spraying; painting; various repairs as necessary

Supporting Examples/Site Anecdotes

The following examples and anecdotes were collected by Drew & Associates during site visits to apartment complexes for interviews with maintenance superintendents and maintenance assistants.

Site 1:

Maintenance Assistant reported that he used a local radio station and his familiarity with its programming to help him estimate the amount of time he spent doing a task, which was helpful in filling out the ***Daily Job List.*** [See task analysis documentation.]

Site 2:

Maintenance superintendent demonstrated his low literacy ability in the following ways

- misread various forms as he explained his job to us
- used a variety of malapropisms and other mispronunciations, e.g., "surface order" for service order
- misidentified sections of manual
- was very defensive regarding question about educational background
- maintained a "common sense defense," i.e., when questioned about the need to read, write or compute in doing a task, he frequently responded that reading wasn't required because he "used his common sense." This was a phrase we heard often at other sites, particularly from low-literate workers.

Site 3:

Maintenance supervisor and assistant each had a shared misconception about the purpose of our visit. The assistant thought we were there to check the legal/immigration status of the assistants, while the superintendent, who had a slight and only mildly noticeable stutter, thought we were there to determine to what extent speech was important to communication on the job. I mention this only because these individuals seemed to be projecting their own personal insecurities about our visit, and this occurred in spite of advance verbal and written communication from me about the purpose of our visit, as well as written communication from the Glick administrative office.

Site 3 cont.

An experienced maintenance assistant, who had experience working with electrical wiring and electrical blueprints, revealed to us by accident that he was completely unaware of a symbol key on the blueprint that could have helped him quickly identify light sockets and receptacles. This was revealed when I asked him to identify a symbol on the blueprint (one which I had already identified by using the key). Instead of consulting the key, he took several minutes to trace the wire from its source and then made a guess that it must be either a light socket or an outlet receptacle. I eventually asked him more direct questions about the key and watched as realization about the key and its purpose dawned on him. He appeared to actually learn the use of the key as we stood over the blueprint.

Maintenance superintendent mentioned that he used a personal computer to assist with landscaping and cataloging of plant types. The computer was not in his office and, though this was not verified, it appeared that the superintendent used his own computer to help with these jobs.

Maintenance assistant reported that although most appliances (e.g., garbage disposals, dishwashers) came with installation instructions, they were always more confusing than helpful and he didn't use them. This may be because this worker had years of hands-on experience. His actual literacy ability was unclear, although this was the same assistant who did not know about the symbol key on electrical blueprints.

Site 4:

Maintenance Superintendent mentioned that his inadequate typing skills slowed him when preparing bid requests and filling purchase requests.

Site 5:

Superintendent told about an assistant who had recently responded to a service request from a tenant who reported having ants in her furnace room. The assistant selected an industrial strength aerosol insecticide and went to the site to spray. The ants were in a closed room which contained a gas furnace and a gas water heater. The worker sprayed the insecticide which was ignited by the pilot lights on the furnace and water heater, causing a minor explosion.

Site 5 cont.

Though no one was hurt, there was a fire which caused damage to the room and personal belongings of the tenant. The supervisor suggested that reading the label might have prevented the problem.

Superintendent noted that the capacitors from air conditioners contained highly toxic PCBs and required special disposal. The handling and disposal is regulated and though they have these disposed of by experts, there is no documentation or safety literature about them.

Superintendent said he often consults the manual to double check his knowledge or to prove himself right.

Superintendent told about his short term as a project superintendent in Miami and of problems he saw working with non-English speaking maintenance workers. He related that superintendents often communicated with workers through use of hand-drawn diagrams (e.g., if a leaky faucet needed repair, the superintendent would draw a dripping faucet on the service request).

Workers at this site were encouraged to read manuals and labels during "down time".

Superintendent discussed his outside reading habits, noted that he was a prolific reader, especially of science fiction, and was proud of his high reading rate.

Superintendent explained the system by which the Glick Management Corporation rewarded sites for doing work themselves rather than sub-contracting out. [We realized that this could serve as an incentive for improving efficiency through better literacy skills.]

Superintendent noted that blueprints sometimes aren't useful because subcontractors often didn't follow them exactly when the building was originally constructed (this was verified at other sites also), and also because contractors and others don't always follow schematics when doing repairs, so over time they became decreasingly relevant.

Site 6:

It was apparent at many sites, but particularly at this site, that the superintendent had not responded to the survey with reference to how he or his workers actually do specific tasks. For example, he noted in the survey the importance of pool maintenance and handling of chemicals related to pool maintenance, but this site does not have a pool. He often said no or very little reading was involved in tasks which he had ranked on the survey as requiring much reading.

The superintendent estimated that 90% of all reading was on service request forms.

APPENDIX E

Analysis of Job Materials
for
Maintenance Workers
and Supervisors

APPENDIX E

List of Job Materials Analyzed for Maintenance Workers and Supervisors

Job Tasks Surveyed

1. USING THE MAINTENANCE WORKER DAILY JOB LIST

2. RESPONDING TO REQUESTS FOR SERVICE IN APARTMENTS

3. LOCATING AN APARTMENT USING A MAP

4. INFORMING RESIDENTS ABOUT SERVICES PERFORMED IN THEIR APARTMENTS

5. COMPLETING MOVE-IN PROCEDURES
    a. ACKNOWLEDGEMENT OF INSTRUCTIONS
    b. MAINTENANCE INSPECTION REPORT
    c. INSPECTION CERTIFICATION

6. USING TECHNICIAN'S MANUAL TO SOLVE ELECTRICAL PROBLEM

7. CONDUCTING "SUMMERIZATION" OF APARTMENT COMPLEX

8. CONDUCTING ANNUAL RECERTIFICATION INSPECTIONS FOR SUBSIDIZED APARTMENTS

9. FILLING OUT "SERVICE WORK ORDER" SUBCONTRACTED REPAIRS AND MAINTENANCE

10. APPLYING CHECKLIST FOR "SERVICE WORK ORDERS" FOR SUBCONTRACTED REPAIRS AND MAINTENANCE WORK WHEN COSTS EXCEED CERTAIN DESIGNATED AMOUNTS
    a. FILLING OUT SPECIFICATIONS FOR SUCH WORK ORDERS
    b. FILLING OUT "REQUEST FOR QUOTATION" ON SUCH ORDERS
    c. EVAULATING BIDS FOR SUBCONTRACTED REPAIRS AND MAINTENANCE

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

1. USING THE MAINTENANCE WORKER DAILY JOB LIST

Daily Job List

Task Description:

The ***Daily Job List*** is the superintendent's method for communicating job assignment to workers on a daily basis. The form provides workers with the tasks they are to do, the sequence for doing them and the time estimated to do each task. Once the worker has filled in the actual time he spent doing a task, the document becomes a record of each worker's daily activity, which is then compiled by the superintendent into a weekly payroll log.

Frequency Performed: Daily

	Type of Material/Task
Prose	
Document	√
Quantitative	√

Misc:

- important, but not critical
- used at all sites

DATE: 3/10/89
EMPLOYEE: Mike

DAILY JOB LIST

PRIORITY		ESTIMATE	ACTUAL
1	PICK UP GROUNDS	2.0	2.0
2	REFURBISH VACANT	4.0	4.5
3	SERVICE REQUESTS	2.0	1.0
	TRAINING	0	0.5

1 - 2

Daily Job List (Form)

This form is used daily by all maintenance assistants and grounds crew members. Each worker is responsible for keeping his own daily record.

Steps of the Sub-Task	Related Literacy Elements in Steps
1-1 Check Job List for Job Assignment.	1.1 ***Locate*** "Date" at top to be sure you are reading today's Job List. 1.2 ***Locate*** "Employee" line to be sure you are reading your Job List. 1.3 ***Scan*** tasks on list to see if familiar with and know how to do task. If know how to do task, proceed. 1.3.1 If not, ***formulate questions***. (E.g. Have I ever done this task before? Who can help me to know what to do. Can I figure it out on my own, or do I need help?)
1-2 Determine which tasks to do 1st, 2nd, 3rd, etc.	2.1 ***Scan*** "Priority" column to see which tasks to do first. *[Note: Tasks are usually, but not always, done in order from top to bottom. There are times when the numbering is changed and the top down order is preempted. This is important for a new worker to know. An experienced worker knows to check the numbering in the priority column.]*

1-4

1-3 Note "Estimated Time" for each task.

3.1 ***Compare*** "estimated time" to personal experience at doing the task.

- 3.1.1 ***Formulate Questions:*** Can this task be done in this amount of time? How does it compare to the rate at which I've done the task before?
- 3.1.2 ***Make mental note*** about how much time to take doing each task.

1-4 Record actual time to complete each task.

4.1 ***Check clock/watch*** at start/completion of each task. Experienced worker makes mental note. New worker may keep notes.

- 4.1.1 ***Subtract*** start time from stop time determine "Actual Time." (Most people do this in their head.)
- 4.1.2 ***Record*** Actual time to the nearest quarter hour in the "Actual Time" column for each task on list.

1-5 Total "Actual Time" column and be sure it equals 8 hours.

5.1 ***Add times*** in "Actual" column to find total. Total should equal the number of hours for a shift (usually 8 hours) and also should be equal to the total "Estimated Time."

- 5.1.1 If total is NOT equal to 8 hours, determine if it is more or less than 8.
- 5.1.2 If within 1 hour, ***adjust actual times*** to add up to 8 hrs.

1-6 Note any major discrepancies in estimated and actual time.

6.1 Determine ***(compare)*** if discrepancy is greater than 1 hour.
  6.1.1 If greater than 1 hour, ***check addition*** to be sure there is no computation error.
  6.1.2 ***Note*** which task(s)differ in estimated vs actual time.
  6.1.3 ***Write*** a brief note to supervisor explaining why a task took more or less time than estimated. (E.g., Ran out of cleaning fluid and needed to go to warehouse for more.)

Note: Experienced worker completes the Daily Job List at the end of the day largely from memory. Experienced workers recalled that when they were new to the job they jotted notes throughout the day and later transferred the times to the form. Experienced workers "confessed" that they manipulated the figures to add up to 8 hours and rarely needed to note any discrepancies for their supervisor.

APPENDIX E

Analysis of Job Materials
for Maintenance Workers and Supervisors

Job Task Surveyed

2. RESPONDING TO REQUESTS FOR SERVICE IN APARTMENTS

Responding to requests for service in apartments.

Task Description:

Service request/record forms are used any time repairs or maintenance are to be performed on an apartment. They may result from an inspection of an apartment or from a resident's call to the rental office for service. If a resident calls for service, the rental manager fills out the top section ("Project Code," "Name," "Date," "Time," "Phone Number," "Apt. Type," "Address," "Apt. #," "Service Needed," "Rental Manager Signature," and usually the unit number corresponding to the address and apartment number) of the service record. If a need for service is determined during an inspection, the supervisor, or sometimes a maintenance assistant, fills out the top section.

Frequency Performed: Several time per week

	Type of Material/Task
Prose	√ (limited summary writing)
Document	√ (forms, maps)
Quantitative	

Misc:

- important, but not critical
- used at all sites

CHN

DEAD BOLT ☐
ANIMAL ☐

RENTAL OFFICE SERVICE RECORD 38793

ENERGY CONSERVATION ☐

PROJECT CODE 032

NAME Melissa Kroure DATE 3-13 TIME

1506

PHONE NO. 813-9502 CIRCLE APT TYPE 1 BR [✓ 2 BR] 2 TH 3 TH. 4 BR

CHG P.H.

ADDRESS 9460 Evergreen APT. # B

SERVICE NEEDED Tub will not drain

TYPE OF SERVICE RENDERED PLUNGED + BLOW BAGGed

MATERIALS USED

			3-15-89	RAD
LABOR CHARGE	MATERIAL CHARGE	TIME ON JOB	DATE	INITIAL

GBCM 106-DIN

TImE = Time call
Ticket/call
Taken

C~~H~~G = Charge

P.~~H~~. = Poor Housekeeping

2 -2

PLEASE MAKE ALL COPIES LEGIBLE CHN

DEAD BOLT ☐ **SERVICE REQUEST—DIVISION I** 38853

ANIMAL ☐ ENERGY CONSERVATION ☐ PROJECT CODE ______

NAME ______________________ DATE __________ TIME __________

PHONE NO. __________ CIRCLE APT TYPE 1 BR. 2 BR. 2 TH. 3 TH. 4 BR.

ADDRESS ______________________________ APT. # __________

SERVICE NEEDED ______________________________

OUR GOAL IS TO PERFORM SERVICE REQUESTS TO THE SATISFACTION OF THE RESIDENT

RENTAL MANAGER SIGNATURE ______________________

GBGM 105-DIV 1

2 - 3

Key Sign-out Sheet

Unit #	Borrower	Date checked Out	Date Returned

Responding to requests for service on apartments.

Service Request/Service Record/Resident Comment (form)

This form is in triplicate. Each layer is labeled differently and contains slightly different sections. However, carbon paper between the top halves of the sheets transfers the following information to all three sheets:

Project Code
Service Needed
Date
Phone Number
Name
Address
Time
Apt. Type
Apt. #

Steps of the Sub-Task	**Related Literacy Elements in Steps**
1-1 Order stack of service records.	1.1 ***Skim*** service record form to determine order in which to respond to them.
	1.1.1 ***Scan*** "Service Needed" section to identify any emergency repairs.
	1.1.2 ***Scan*** "Address" section and, imagining mental map of apt. complex, determine where apartments requiring service are located.
	1.2 ***Prioritize tasks*** in order.
	1.2.1 ***Assign*** top ***priority*** to emergency repairs. If necessary, ***compare*** jobs to determine greatest urgency.
	1.2.2 ***Prioritize*** rest of jobs according to where they are located, grouping sites near to each other, and plotting an efficient order.

1-2 ***Determine*** what equipment and supplies to take along.

2.1 Again, ***scan*** "Service Needed" section to see if job is familiar and if know how to do. If know how to do, proceed.

- 2.1.1 If not, ***formulate questions*** (E.g., Have I ever done this job or a similar one before? Who has done this job and can help me?)

2.2 Relying on previous experience, advice, and imagined contingencies, ***determine*** what equipment and supplies to take along.

1-3 ***Determine*** which keys are necessary and obtain them.

3.1 ***Scan*** service requests and ***locate*** apt. unit numbers.

- 3.1.1 If unit number is not provided, ***ask*** supervisor or rental manager, or,
- 3.1.2 ***Scan map*** of apt. complex, ***match*** building name, ***locate*** building number and ***apply "formula"*** to determine unit number.

[Note: Apartments are assigned unit numbers so that keys can be labeled in such a way that they would be very difficult to use to enter an apt. if stolen. The unit number is composed of the building number, recorded on maps and blueprints, and a number for the apartment in the building. There is a system for determining the latter based on the location of the apartment in the building. Workers interviewed found it difficult to explain this system and seemed to rely on the rental manager for obtaining unit numbers.]

3.2 ***Match*** unit numbers on service request to unit numbers on keys and select the needed keys.
3.3 On "Key Check Out Sheet," ***locate*** "Unit Number" column.
    3.3.1 ***Transfer*** unit numbers of keys taken.
3.4 ***Locate*** "Date Checked Out" column.
    3.4.1 ***Fill in*** today's date for each key taken.
3.5 ***Locate*** "Borrower" column.
    3.5.1 ***Initial*** space for each key taken.

1-4 Go to apartment and perform needed service.

4.1 ***Locate*** "Address" section to determine which building to go to.
    4.1.1 ***Match*** address number on service record to address number on building.
4.2 ***Locate*** "Apt.#" section to determine which apartment to go to.
    4.2.1 ***Match*** apt. number on service record to number on apartment door.
4.3 ***Locate*** unit number on service record and ***match*** to unit numbers on keys to ***select*** correct key.
4.4 If dead bolt or dog prevents entry to apartment, ***locate*** "Dead Bolt" or "Animal" box on service record and "x" appropriate box. *[Note: at this point fill out and leave* ***Red Door Tag.****]*
4.5 If entry is not prevented, enter apartment, and ***locate*** "Service Needed" section of service record.
    4.5.1 If specific service is requested, perform the service.

4.5.2 If problem is described, ***formulate hypothetical causes*** of problem, ***brainstorm*** possible solutions, ***prioritize*** possible solutions in terms of their likely success. Try possible solutions until problem is remedied. (For example, if a ceiling light is not working, possible solutions might include that the bulb is burned out, that there is a problem in the wiring somewhere between the bulb and the switch. An experienced worker would probably begin by checking the bulb since it is the most common cause encountered and the easiest approach with which to begin.) *[Note: More experienced workers rely on previous experience to solve such problems. They formulate such questions as,* Where have I seen this problem before? How did I solve it then? *They also find it easier to generate possible solutions and determine which solution is most likely to be successful.]*

1-5 ***Record*** service performed.

5.1 ***Locate*** "Type of Service Rendered" section.

5.1.1 ***Summarize*** service performed and ***note*** in the "Type of Service Rendered" section. (E.g., in response to a request to fix a tub that would not drain, maintenance worker might write: "Plunged and blow bagged." In response to request to fix a stove burner that would not work, maintenance worker might write "replaced element.")

5.2 ***Locate*** "Materials Used" section.

  5.2.1 ***List*** any parts used.

5.3 Determine if resident should be charged for the service by ***applying understanding of "rule"*** (charge if resident's neglect or misdeed caused the problem) or by asking supervisor. If shouldn't be charged, proceed. (E.g., if a window screen tears during what appears to be normal use, no charge would be made. However, if it tears because the resident's cat clawed it, a charge would be made. Similarly, if a glass ceiling light shade has to be replaced due to resident breaking it while playing ball in the apartment, a charge would be made.) *[Note: This "rule" and its application in specific instances should be taught to new employees.]*

  5.3.1 If should be charged, ***locate*** "CHG" box and "x" it.

  5.3.2 ***Locate*** "Material Charge" section.

  5.3.3 ***Add up costs*** of parts used and ***record*** sum. If cost of parts is not known, ***look up*** on invoice, inventory list, or ask supervisor. *[Note: "Labor Charge" section is not filled out if a maintenance assistant or supervisor performed the service. However, if a subcontractor, such as a painter or plumber, performed the service, the labor cost billed by the subcontractor is filled in here and billed to the resident.]*

	5.4 ***Locate*** "Time on Job" section. 5.4.1 ***Estimate*** how long the job took, ***rounding off*** to 15 minute intervals, and ***record***
1-6 Assess whether poor housekeeping should be noted.	6.1 In subsidized apartments, ***determine*** if poor housekeeping should be noted based on internalized standards. 6.1.1 If poor housekeeping should be noted, ***locate*** "P.H." box and "x."
1-7 Complete the Service record form.	7.1 ***Locate*** "Date" section at bottom of form and ***record*** today's date. 7.2 ***Locate*** "Initial" section and put own initials.
1-8 Return keys.	8.1 ***Scan*** "Key Check Out Sheet" and ***match*** unit number of key to be returned to unit numbers listed in "Unit Number" column. 8.1.1 ***Locate*** "Date Checked Out" entry for that unit number. 8.1.2 ***Compare*** date checked out to today's date. 8.1.3 If same, ***check*** the space in "Date Returned" column. 8.1.4 If different, ***enter*** today's date in "Date Returned" column.

[Note: Service request/record forms are used any time repairs or maintenance are to be performed on an apartment. They may result from an inspection of an apartment or from a resident's call to the rental office for service. If a resident calls for service, the rental manager fills out the top section ("Project Code," "Name," "Date," "Time," "Phone Number," "Apt. Type," "Address," "Apt. #," "Service Needed," "Rental Manager Signature," and usually the unit number corresponding to the address and apartment number) of the service record. If a need for service is determined during an inspection, the supervisor, or sometimes a maintenance assistant, fills out the top section.]

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

3. LOCATING AN APARTMENT USING A MAP

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

3. LOCATING AN APARTMENT USING A MAP

LOCATING AN APARTMENT USING A MAP.

Task description:

Most maintenance offices visited have a small map of their apartment complex posted on the wall. Often the map seemed to be a photocopied portion of a blueprint. It is used by the maintenance staff for a variety of purposes. A superintendent might refer to it when discussing grounds work in a certain area of the complex with a worker about to perform that work. A maintenance assistant might use it to help her/him locate an apartment in order to respond to a service request. Since the map usually includes building numbers, it can be used to help figure out bldg/unit numbers in order to identify the key to an apartment (apartment keys are labeled with a number that reflects the building number and a number designating the location of the apartment in the building). Also, a superintendent might use the map to indicate to subcontractors (contracted to do such work as painting, carpet cleaning, parking lot resurfacing, and grounds work) where they should go.

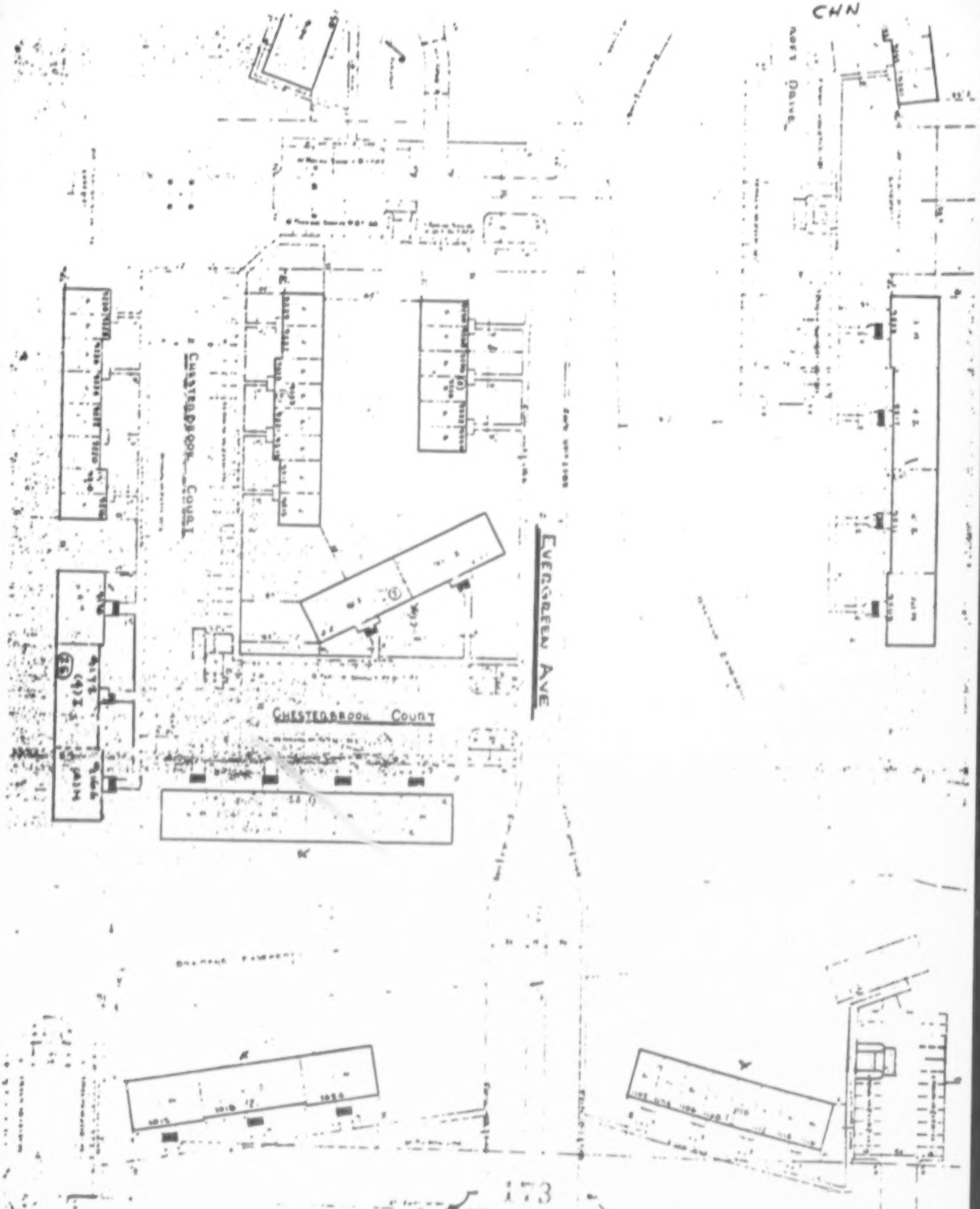
Frequency performed: Varies from site to site; at the site at which this particular map-reading task was analyzed, the worker used it very seldom because he said he knew where buildings were located. However, it also seemed apparent that his map-reading skills were not as sharp as they could have been (nor was the map as readable as would be ideal). An overall 'guesstimate' across sites is that this sort of map reading task is performed around 3 or 4 times each month by someone on the maintenance staff.

	Type of Material/Task
Prose	
Document	✓ (map reading)
Quantitative	

Misc.:

- not a critical task, but can affect efficiency of many work tasks
- performed at all sites

CHN


ROST DRIVE
CHESTERBROOK COURT
CHESTERBROOK COURT
EVERGREEN AVE

173

3 -2

LOCATING AN APARTMENT USING A MAP.

Steps of Sub-Task	Related Literacy Elements in Steps
1-1 Find street name of apartment to be located.	1.1 ***Scan*** written material (e.g., service request) to locate street name of apartment to be located. 1.2 ***Scan*** map to match street name of apartment with street name on map. 1.2.1 ***Apply knowledge*** of unwritten 'key' to the map (e.g., street names are double underlined) to help scan street names. *[Note: a more experienced worker is far more likely than a less experienced worker to have figured out or learned a key to the map. Hence, s/he is far more likely to be able to scan quickly to locate a street name than is a less experienced worker. A less experienced worker might have to search the map carefully several times before locating the street name. Similarly, a worker with good map reading skills is far more likely to understand that figuring out a key to the map will help her/him locate places.]* 1.2.2 ***Use previous knowledge*** of the apartment complex to 'get one's bearings' (to figure out where one is on the map to begin with and to turn the map in the direction that makes the most sense for finding the street being sought) and to look in the area where one expects the street to be (based on a general sense of the layout of the complex). 1.2.3 Perhaps turn the map while scanning for the street, testing various

'hypotheses' as to where the desired street is located.

  - 1.2.4 Perhaps refer to the address of the apartment to reconfirm which street one is looking for (particularly if worker is having difficulty locating the street).
  - 1.2.5 Once the street is located, make a mental note of its location.

1-2 Locate the specific apartment.

- 2.1 ***Scan*** written material (e.g., service request) to locate street address number of apartment to be located.
- 2.2 ***Scan*** the map to relocate the street.
- 2.3 ***Scan*** map to match street address number of apartment to be located with street address number on map (on the correct street).
  - 2.3.1 Rely on previous knowledge of which way the numbers run on a street (e.g., they go up as one goes west) to locate the street address number. Or, figure out which way the numbers run to locate the street address number.
  - 2.3.2 Refer to the address of the apartment to confirm which street number one is looking for.
  - 2.3.3 Once the street address number is located, ***make a mental note*** of its location.

1-3 Plot the easiest way to get to the apartment.

- 3.1 Applying previous knowledge (e.g., how one drives to work, on which street the maintenance office is located), ***scan*** the map to locate the maintenance office (presumably where the worker is starting out from). *[Note: once again, the extent of the worker's familiarity with the apartment complex and of her/his map reading skills affect how easily this step*

can be completed.]

- 3.1.1 Turn the map so it is easiest to see how to go from the maintenance office to the apartment.

3.2 Based on the distance between the maintenance office and the apartment, and what kind of equipment must be transported, determine whether should drive or walk to the apartment.

- 3.2.1 ***Apply previous knowledge*** of distance between locations on the map to determine approximately how far away the apartment is.
- 3.2.2 If previous knowledge of the distance between the maintenance office and some location other than the apartment is used as a reference for judging distance, ***compare*** the reference distance with the distance between the maintenance office and the apartment.
- 3.2.3 ***Decide*** whether the distance is short enough to walk (or long enough to require driving).

3.3 ***Plot a course*** between the maintenance office and the apartment.

- 3.3.1 If driving, follow streets to plot the course and, ***translate*** plotted course into directions (e.g., turn right at the first street, take the second left).
- 3.3.2 If walking, might plan to cut across parking lots and grassy areas while plotting course. ***Translate*** plotted course into directions (e.g., walk past the pool, go to the second building on the right, fourth townhouse in the building).
- 3.3.3 ***Make a mental note*** of these directions or jot them down.

[Note: In general, new workers, unfamiliar with the apartment complex, and perhaps unfamiliar with the layout and terminology of apartment complexes in general (e.g., 'town house,' 'flat'), have a greater need to refer to a map when locating an apartment than do more experienced workers. However, a new worker's lack of familiarity with the complex makes it difficult to read the map (it's harder to get one's bearings, to use reference points to navigate on the map, to check if one has located the correct apartment, etc.), particularly if her/his map reading skills are weak.

The map used for this task analysis is part of a blue print; thus it didn't photocopy very well. However, the original also was difficult to read. The worker interviewed helped us to construct an informal key to the map (no formal key was printed on the map):

** street names are double underlined*
** building numbers are circled*
** numbers appearing on individual apartments are 'street addresses' (not unit numbers)*
** townhouses are divided from each other by dashed lines]*

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

4. INFORMING RESIDENTS ABOUT SERVICES PERFORMED IN THEIR APARTMENTS

INFORMING RESIDENTS ABOUT SERVICE PERFORMED ON THEIR APARTMENTS

Task Description:

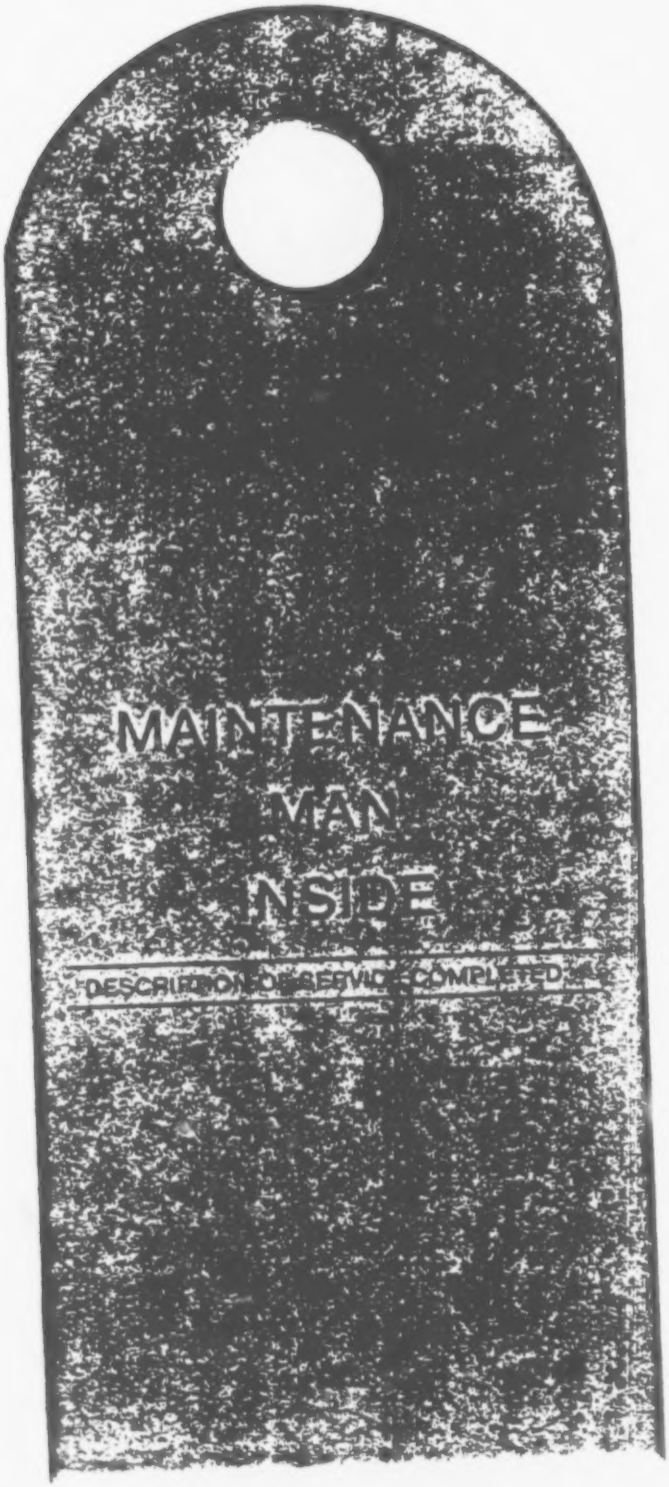
Red door tags are used to inform residents when: (1) a maintenance person could not get into their apartment (usually because a dead bolt is locked or a pet threatens them) to perform requested service; (2) a maintenance worker could not perform requested service for some reason (e.g., s/he didn't have the necessary part or the necessary expertise); (3) work not requested by the resident was performed on the apartment (e.g., furnace filter was replaced, smoke alarm battery was replaced, smoke alarm was tested) while the resident was away; (4) a maintenance person currently is working inside the apartment; (5) a maintenance worker completed requested service while the resident was away and wants to inform the resident about what service was performed. The same red door tag might be used for more than one of the above described purposes for a particular apartment.

Frequency performed: Varies from site to site depending on what purpose each site uses it for. If the red door tag is used only to indicate when a maintenance worker can't gain entry to an apartment or can't complete requested service for some other reason, then it may be used as seldom as once per month. If the red door tag is used any time service is performed on an apartment while the resident is away, then it may be used far more frequently depending on the size of the apartment complex.

Type of material/task: document (form): sometimes prose (very limited summary writing)

Misc.:

- not critical
- used at all sites (but for varied purposes)



MAINTENANCE

MAN

INSIDE

DESCRIPTION OF SERVICE COMPLETED

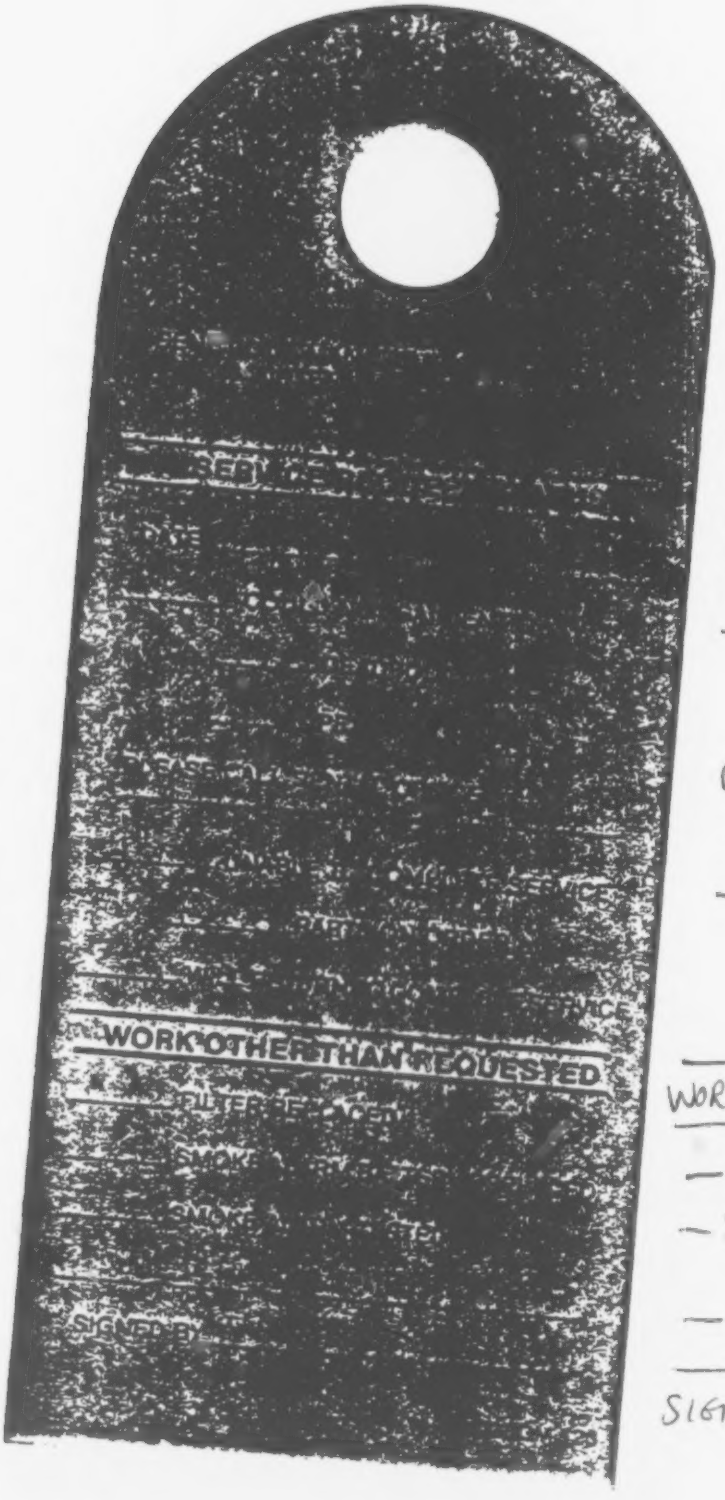
MAINTENANCE

MAN

INSIDE

DESCRIPTION OF SERVICE COMPLETED

4 -2



WORK OTHER THAN REQUESTED

SERVICE REQUEST STATUS

DATE __

- _ COULD NOT GAIN ENTRY
  - _ DEADBOLT
  - _ PET

PLEASE CALL RENTAL OFFICE

- _ UNABLE TO COMPLETE SERVICE
  - _ PART ON ORDER
  - _ WILL RETURN TO COMPLETE SERVICE

WORK OTHER THAN REQUESTED

- _ FILTER REPLACED
- _ SMOKE ALARM BATTERY REPLACED
- _ SMOKE ALARM TESTED

SIGNED BY ____________

Red Door Tag

This tag, designed to hang on a door knob, doesn't have a formal name. One side states in large letters "Maintenance Man Inside" and has a space in which to record "Description of Service Completed." The other side has two main sections, labeled in bold "Service Request Status" and "Work Other Than Requested." Each of these two sections has several items to check off and/or blanks to fill in. There also is a place for the maintenance worker to sign.

I-1 Determine which section of the door tag to fill out (depending on the reason why the maintenance worker wants to leave the tag for the resident--see description above).

1.1 Scan the bold headings to determine which section of the tag to fill out.

I-2 Fill out the appropriate section of the tag.

2.1 If filling out the "Service Request Status" section because couldn't gain entry to the apartment.

2.1.1 Locate the space labeled "Date" and fill in today's date.

2.1.2 Locate and check the space by "Could Not Gain Entry."

2.1.3 Locate and check the space by the reason why couldn't get in, either "Deadbolt" or "Pet."

2.1.4 Underline the statement "Please Call Rental Office" and recall and write down the phone number of the Rental Office on the dotted line.

2.2 If filling out the "Service Request Status" section because couldn't complete requested service.

2.2.1 Locate the space labeled "Date" and fill in today's date.

2.2.2 Select and check the space by the appropriate combination of statements (i.e., "Unable to Complete Service," "Parts on Order," "Will Return to Complete Service Later"). For example, if the maintenance worker discovered in attempting to repair a stove that s/he needed a part, s/he might check all three statements. However, if s/he decided that one of the other workers was needed to help complete a complicated job task, s/he might check only "Will Return to Complete Service Later."

2.3 If filling out the "Work Other Than Requested" section because service was performed that the resident hadn't requested.

2.3.1 Determine if the service performed fits one of the routine categories listed on the tag (i.e., "Filter Replaced," "Smoke Alarm Battery Replaced," or "Smoke Alarm Tested") and check the space by the appropriate category. Or, 2.3.2 If the service performed does not fit one of the routine categories, summarize the service performed in a very brief phrase, write down the phrase in the space provided, and check the space by the phrase. For example, if the maintenance worker entered the apartment to perform routine household insecticide spraying, s/he might write "bug spraying" in the blank space provided and put a check by the phrase.

2.4 If filling out the "Description of Service Completed" section.

2.4.1 Summarize the service performed in a couple of brief phrases and write down the summary in the space provided. For example, a maintenance worker might write "spackled hole in hallway wall and touched up paint."

I-3 Sign name.

3.1 Scan tag to locate line labeled "Signed By."
3.2 Sign own name in the space provided.

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

5. COMPLETING MOVE-IN PROCEDURES

COMPLETING MOVE-IN PROCEDURES.

I "Acknowledgement of Instructions."
II "Maintenance Inspection Report."
III "Inspection Certification."

Overall tasks description:

There is a set of procedures a maintenance worker follows when processing a resident in preparation for her/him to move into an apartment. In general, the move-in procedures serve two purposes. First, they involve introducing the new resident to how items in the apartment work (e.g., the stove, refrigerator, furnace) and to rental management policies regarding residency in the complex (e.g., pet policy, paint/wall paper policy, waterbed policy). Second, they involve inspecting the apartment in order to determine what repairs, if any, still need to be completed on the apartment at the time a new resident is moving in and what damage cannot be repaired but should be noted so the new resident is not charged for it upon moving out of the apartment. These procedures are conducted by the maintenance worker (a superintendent or assistant) and the rental manager in the presence of the new resident.

Three different forms are used when completing move-in procedures: (1) "Acknowledgement of Instructions;" (2) Maintenance Inspection Report;" and (3) "Inspection Certification."

Frequency performed: Every time a new resident moves in--as often as several times per week.

	Type of Material/Task
Prose	✓ (brief summary writing)
Document	✓ (forms)
Quantitative	

Misc.:
- very important task
- used at all sites

ACKNOWLEDGEMENT OF INSTRUCTIONS

I have received a copy of the Gene Glick Management Corporation Resident Information Handbook and instructions regarding the following information was provided to me during my move-in inspection and when I signed my lease.

Property Manager: Please check next to the items that apply to your community.

_____ Location and use of fire extinguisher.

_____ Location and operation of fuse box.

_____ Location and use of re-set button on garbage disposal.

_____ Location and operation of intercom system.

_____ Location and operation of furnace/air conditioner thermostat.

_____ Operation of range/oven.

_____ Location and operation of water supply cutoff.

_____ Location and use of Vial of Life.

_____ Location, purpose, and operation of emergency pull-cord.

_____ Renter's insurance.

_____ Rent due date.

_____ Rent collection policy.

_____ Service request procedure.

_____ Emergency service procedure.

_____ Key and lock policy.

_____ Security deposit policy.

_____ Window draping policy.

_____ Pet policy.

_____ Visitor policy.

_____ Paint/wallpaper policy.

_____ Wall hangings policy.

_____ Waterbed policy. (Minimum $10,000 Waterbed Insurance required.)

______________________	______________________
Resident Name (Typed)	Apartment Address
______________________	______________________
Resident Signature	Date
WILLIAMSBURG NORTH	INDIANAPOLIS, INDIANA
Name of Community	Location

RM-III-2aa (Rev. 4/88) [36]

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GENE·GLICK MANAGEMENT CORP.

MAINTENANCE INSPECTION REPORT

P. O. BOX 40177

INDIANAPOLIS, INDIANA 46

Resident	Address	Apt.	Project	Phase	Turn in Date

CIRCLE UNIT TYPE EFF. 1 BR 2 BR 2 TH 3 TH 4 BR

Items Repaired	✓	MOVE IN	MOVE OUT	COST
Air Conditioner		Setting 83°	Turned—off	
Furnace		Setting 55°	Setting 55°	
Furnace Filter				
Water Heater				
Disposal				
Range Hood & Filter				
Cabinets & tops				
Range				
Refrigerator			Turned off—Left door open	
Light fixtures & bulbs				
Switches & wall plugs				
Bi-fold doors				
Passage doors				
Entry doors				
Patio door				
Interior & exterior locks				
Windows & sills				
Screens				
Traverse rods				
Tub, lavatory & sink				
Stool & seat				
Medicine cab.				
Exhaust fan				
Towel bars				
Tissue holder				
Grab bar & soap dish				
Glass holder				
Plumbing fixt.				
Grouting				
Carpet cleaning				
Tile floors				
Maid Service				
Fire extinguisher				
Smoke detector				
Painting				
Spackling				
Patio or fence				
Keys (Number)				
T.V. Adapter				
Dowel Rod				
Left Warning Sign				
Other				
			TOTAL	

I certify that the foregoing report correctly represents the conditions of the above-identified unit.

RESIDENT SIGNATURE DATE

I certify that the foregoing report correctly represents the condition of the above-identified unit. If this report discloses any deficiencies, I certify that they will be remedied within 30 days of the date this Tenant moves into this unit.

R.M. OR P.M.S. SIGNATURE DATE

Exception—Permanent Damage

I WAS PRESENT DURING THE INSPECTION OF THIS APARTMENT.

157

RESIDENT SIGNATURE DATE

R.M. OR P.M.S. SIGNATURE DATE

5-3

ACCOUNTING

13a REV 4/

Gene Glick MANAGEMENT CORPORATION

** INSPECTION CERTIFICATION

PROJECT NAME WILLIAMSBURG NORTH UNIT ADDRESS ____________________

I certify that the foregoing report correctly represents the conditions of the above-identified unit.

______________________________ ____________
Resident Signature Date

I certify that the foregoing report correctly represents the condition of the above-identified unit. If this report discloses any deficiencies, I certify that they will be remedied within 30 days of the date this Tenant moves into this unit, with the exceptions listed below.

______________________________ ____________
RM or PMS Signature Date

EXCEPTIONS - PERMANENT DAMAGE

____

____

____

____

RM-III-12g

5-4

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

5. COMPLETING MOVE-IN PROCEDURES

  a. ACKNOWLEDGEMENT OF INSTRUCTIONS

COMPLETING MOVE-IN PROCEDURES.
"Acknowledgement of Instructions."

All three forms listed above are used when completing move-in procedures. Generally, the maintenance worker performing the procedures switches from form to form. However, each form is analytically distinct and we have examined them separately. The "Acknowledgement of Instructions" form guides the move-in procedures. It consists of a list of 22 items the maintenance worker (and the rental manager) are supposed to explain to the tenant (e.g., "location and use of the fire extinguisher," "operation of range/oven," "wall hangings policy"). Each item is checked off (by the maintenance worker or the rental manager) to indicate that it was explained to the resident. There is an area at the bottom for the new resident to sign and date to indicate that she/he has received a copy of the Gene Glick Management Corporation Resident Information Handbook and instructions about each of the items on the list.

Steps of Sub-Task	Related Literacy Elements in Steps
1-1 Take the new resident through the apartment, room by room, and explain each item on the list to the resident.	1.1 ***Scan*** the list and determine which item to explain first (and the subsequent order in which items are explained). *[Note: less experienced workers generally work down the list and cover each item in order. More experienced workers generally follow a pattern reflecting the layout of the apartment. For example, the worker we interviewed took us through the kitchen, downstairs hallway, bathroom, living room, etc. Thus, he skipped around on the list (e.g., he initially skipped the "location and operation of furnace/air conditioner thermostat" and later came back to it).]*
	1.2 Use the brief phrase describing an item to be explained (e.g., "operation of range/oven") as a cue to ***recall*** a series of steps/procedures/policies to include in the explanation of the item. For example, the "operation of range/oven" entails

explaining how the range top pilot light works, how the oven pilot light works, what to do if one smells gas, how the burners work, how the oven setting knobs work, how the oven light works, how to disassemble the burners for cleaning, how to clean the oven, etc.

1.2.1 ***Anticipate problems*** the resident might eventually face or questions she/he might have, and ***answer*** them. These might be formulated as mental questions by the maintenance worker (e.g., "What should I do if the furnace pilot goes out?" "What should I do if I notice the fire extinguisher needs recharging?").

1.2.2 ***Respond to any questions*** the resident asks about the item being explained or any other aspect of the apartment. For example, there's no item on the "Acknowledgement of Instructions" referring to the operation of the patio or balcony door. However, a resident might ask such questions as: "How is the best way to secure the balcony door?" "Do I get a key to the patio door?"

1.2.3 If the resident asks no or very few questions, ***ask the resident questions*** to determine whether s/he understands the information being explained or has questions s/he hasn't asked. Such questions might include, "Do you understand how to reset the garbage disposal?" "Do you have any questions about the operation of the air conditioner?" *[Note: the maintenance worker's general knowledge of the operation of items in the apartment, her/his*

5a -2

knowledge of rental management policies, and her/his interpersonal skills directly affect the thoroughness and effectiveness of this procedure.]

1.3 Once an item on the list has been explained, ***scan*** the list and ***locate*** it.

  1.3.1 ***Place a check*** in the space to the left of the item just explained.

1.4 ***Determine*** which items on the list not to explain.

  1.4.1 ***Skip items*** which are not relevant to the complex. For example, the complex at which we conducted this task analysis did not have intercom systems so the maintenance worker conducting the move-in procedures skipped the item "location and operation of intercom system." In general, the items "location and use of Vial of Life" and "location, purpose, and operation of emergency pull-cord" are relevant only in elderly housing.

  1.4.2 ***Skip items*** which are explained (at that particular complex) by the rental manager or about which the maintenance worker is unsure. For example, at some sites all items referring to rental management policies might be explained by the rental manager. In contrast, during our analysis of this task the maintenance worker explained such procedure and policy items as: "service request procedure;" "emergency service procedure;" "window draping policy;" "paint/paper policy;" "wall hangings policy." He did not explain the items: "renter's insurance;" "rent due date;" "rent collection policy;" "key and lock policy;" "security deposit policy;" "pet policy;" "visitor policy;" "waterbed policy." These items are explained at this site by the rental manager to the new resident.

1.5 ***Explain*** each item on the list that is relevant and not covered by the rental manager.
    1.5.1 While conducting the apartment tour, periodically ***refer to the list*** to be sure no items are inappropriately skipped.
    1.5.2 Before completing the procedure, ***scan*** the list, paying special attention to items that have been skipped, to be sure that all necessary instructions have been given to the resident.

1-2 Have the new resident sign and date the bottom of the "Acknowledgement of Instructions."	2.1 ***Scan*** the form and ***locate*** the line labeled "Resident Signature" and have the resident sign her/his name on the line. 2.2 ***Scan*** the form and ***locate*** the line labeled "Date" and have the resident date the form.

[Note: the lines labeled "Resident Name" and "Apartment Address" are filled in (typed) by the rental manager before the tour of the apartment is conducted.]

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

5. COMPLETING MOVE-IN PROCEDURES
   b. MAINTENANCE INSPECTION REPORT

COMPLETING MOVE-IN PROCEDURES.
"Maintenance Inspection Report."

The "Maintenance Inspection Report" is completed by the maintenance worker at the time s/he tours the apartment with the new resident to explain the items on the "Acknowledgement of Instructions" form. In fact, during the tour the maintenance worker often might switch from form to form.

The "Maintenance Inspection Report" is in a five-copy set, each identical copy separated by carbon paper so all information written transfers to each copy. The five copies are designated: "Accounting;" "Rental Manager;" " Accounting/Resident;" "Resident M.O." [move out]; and "Resident M.I." [move in]. The top section is filled in (typed) by the rental manager and includes the information: "Resident;" "Address;" "Apt.;" "Project;" "Phase;" "Turn in Date;" and "Unit Type." The bottom section includes spaces for the resident's signature and the date, and the "R.M.'s or P.M.S.'s (Rental Manager's or Property Manager's) signature and date.
Most of the form consists of a list of 42 items (e.g., "air conditioner," "switches and wall plugs," "spackling") to be inspected by the maintenance worker. There is a space by each item to record brief descriptions of which items, at the time of move in, require repairs or servicing. There also is a column to be checked once the necessary repair or service has been completed on the item.

The same "Maintenance Inspection Report" form is used as part of both the move-in procedures and the move-out procedures for a particular resident. There is a space by each item to record brief descriptions of which items, at the time of move out, require repairs or servicing. There also is a column for noting the cost for the repair or service to be charged to the resident (against or beyond her/his rental deposit). There is a space to total these charges and areas for the resident's signature and the date, and the R.M.'s or P.M.S.'s signature and the date. The move-out inspection consists of very similar procedures to those of the move-in inspection, and we did not analyze it as a separate task.

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Steps of Sub-Task	Related Literacy Elements in Steps
II-1 While touring the apartment with the new resident (and explaining items listed on the "Acknowledgement of Instructions"), inspect the relevant items in each room.	1.1 Once have entered a room or area in the apartment, ***determine*** which items on the list to inspect. *[Note: more experienced workers probably have developed a pattern they follow when conducting the inspection. The worker we interviewed to analyze this task switched adroitly between the "Acknowledgement of Instructions" form and the "Maintenance Inspection Report" when conducting the tour of the apartment. However, a less experienced worker might find it very confusing to switch between the forms. Hence, s/he might conduct two separate tours of the apartment, one to complete each form. Also, s/he might attempt to inspect each item on the "Maintenance Inspection Report" in the order in which it appears on the form.]* 1.1.1 ***Scan*** the list to ***locate*** items located in the room or area of the apartment one is in. Make a mental note of these items. 1.1.2 ***Scan*** the list to ***determine*** which items are not located exclusively in one particular room or area, but need to be inspected in a variety of rooms/areas. For example, "light fixtures & bulbs," "switches & wall plugs," and "windows & sills" must be inspected in each room/area of the apartment. Make a mental note of these items. 1.1.3 Either ***inspect*** each item as one locates it on the list, ***scan*** the list again to ***locate*** the next item to inspect in the room/area, inspect it,

scan the list again, etc. (For example, in a half bath the first item on the list that should be inspected is "light fixtures & bulbs.") Or,

1.1.4 ***Scan*** the list once to refresh memory as to what should be inspected in that room/area, determine a sequence for inspecting each item, complete the inspections, and, perhaps, recheck the list, scanning for any items missed. (For example, in a half bath the relevant items are: "light fixtures & bulbs," "switches & wall plugs," "passage doors," "interior & exterior locks," "tub, lavatory & sink," "stool & seat," "medicine cab.," "exhaust fan," "towel bars," "tissue holder," "grab bar & soap dish," "glass holder," "plumbing fixt.," "grouting," "tile floors," "painting," and "spackling." *[Note: this latter strategy is the one more often relied upon by very experienced workers, who have worked out a routine for conducting an apartment move-in inspection.]*

1.2 Use the brief heading of an item to be inspected (in the particular room/area) as a cue to ***recall*** what problems to look for, and/or what steps to follow when inspecting it.

1.2.1 ***Anticipate*** likely problems with the item and look for them. For example, when inspecting a window screen in a room, the inspecting maintenance worker might look for the following problems: there is no screen in the window; the screen does not fit the window properly; the screen does not slide up and down (or sideways) easily; there are holes in the screen.)

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[Note: a more experienced worker is better able to anticipate possible problems to look for in an item and, hence, conducts the inspection of an item more efficiently. A less experienced worker might simply look at an item, missing a problem, or might spend more time than necessary inspecting an item.]

1.3 When inspecting a particular item, ***determine*** whether its features or operation should be explained to the new resident; ***provide an explanation or demonstration,*** if necessary.

1.3.1 If an item on the "Maintenance Inspection Report" also is listed on the "Acknowledgement of Instructions," then it must be explained to the resident. For example, the garbage disposal is listed on both forms.

1.3.2 If an item is listed only on the "Maintenance Inspection Report" but it requires operation by the resident, then the inspecting maintenance worker probably provides an explanation or demonstration of its operation. For example, a hall light on a three-way switch might be demonstrated to the new resident, indicating where the switches for the light are located. Other items that might be explained (but are not listed on the "Acknowledgement of Instructions) include the operation of: windows, storm windows, and screens; locks on interior doors; plumbing fixtures; light fixtures; and, exhaust fans. *[Note: these explanations are not required as part of the formal inspection process, but* *more experienced and helpful workers routinely provide them.]* This step might include anticipating problems the resident might eventually face or questions she/he might have, and answering them. These questions might be formulated mentally by the inspecting maintenance worker (e.g., "How do traverse drapery rods work?" "What kind of drapery hooks should I use with them?").

1.3.3 ***Respond to any questions*** the resident asks about the item being inspected. For example, a resident might ask "How do I put a bi-fold door back on its track when it has slipped off?"

II-2 When an item listed on the "Maintenance Inspection Report" has been found to be in need of repair or servicing, note the necessary repair/servicing on the form.

2.1 If there is a problem with an item ***determine*** whether it can be repaired/serviced/replaced or if the damage is permanent.

2.1.1 ***Utilize previous experience*** to determine whether the item can be repaired/serviced/replaced. (For example, a broken toilet seat might need to be repaired or replaced.) If the item can be repaired/serviced/replaced, go on to the next step.

2.1.2 If the item cannot be repaired/serviced/replaced, or replacement is inappropriate because the problem is cosmetic or the cost of replacement is exorbitant (based on previous knowledge), switch to the "Inspection Certification" form. *[Note: see separate task analysis.]* Examples of such items might include, permanent stains on carpets, bad scratches on appliances, and cracks in patio concrete.

2.2 ***Scan*** the form to ***locate*** the appropriate space in which to record a description of the problem--locate the appropriate item and the space to the right of it. For example, if a toilet seat is cracked, locate the item "stool & seat."

2.3 In a very brief phrase, ***describe*** the location of the item (if necessary), summarize the nature of the problem with the item, and (if possible) hypothesize the nature of the necessary repair/servicing/replacement. For example, if the toilet seat in the downstairs powder room is cracked, the entry next to the item "stool & seat" might read: "replace 1/2 bath toilet seat due to crack." This step might require synthesis of pieces of information, as demonstrated in the previous example. [Note: more experienced workers are more likely to suggest the remedy for the problem (in addition to providing a description of the problem.)]

2.4 ***Make a mental note*** to fill out (or to have the rental manager or maintenance superintendent fill out) a "Request for Service" form about the item. *[Note: see task analysis titled 'Responding to Service Requests.']*

II-3 Double check the list of items to be sure each one has been inspected before completing the inspection tour of the apartment.

3.1 ***Scan*** the list for each item for which no problems have been recorded.

3.2 ***Determine*** whether no problems have been listed because the item was inspected and found to not need repair/servicing/replacement, because the item was inspected and permanent damage

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was recorded on the "Inspection Certification" form, or because the item was not inspected.

3.3 If an item was not inspected, return with the resident to the room/area in which the item is located and inspect it following the procedure described above.

II-4 Have the resident sign and date the bottom of the "Maintenance Inspection Report" and sign and date it oneself (unless the rental manager usually performs this step.)

4.1 Based on previous experience or knowledge of rental office procedures, ***determine*** whether it is appropriate to complete the box on the lower right of the form.

- 4.1.1 If the rental manager usually performs this step, leave the box blank.
- 4.1.2 If the inspecting maintenance worker (particularly a maintenance superintendent) usually performs this step, go on.

4.2 ***Scan*** the box to ***locate*** the line for "Resident Signature" and "Date."

- 4.2.1 ***Show*** the resident where to sign and date the form, supervise the resident's signing and dating of the form.
- 4.2.2 ***Point out*** the statement above the line ("I certify . . . ") and explain to the resident that her/his signature indicates that the report accurately reflects the current conditions of the apartment.

4.3 ***Scan*** the box to ***locate*** the line for the "R.M. or P.M.S. Signature" and "Date."

- 4.3.1 ***Sign and date*** the form.
- 4.3.2 ***Point out*** the statement above the line ("I certify . . . ") and explain to the resident that the R.M.'s or P.M.S.'s

signature indicates that the report accurately reflects the current conditions of the apartment and that any problems noted on the form will be repaired within 30 days from the time the resident moves into the apartment.

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

5. COMPLETING MOVE-IN PROCEDURES
   c. INSPECTION CERTIFICATION

COMPLETING MOVE-IN PROCEDURES.
"Inspection Certification."

The "Inspection Certification" form serves somewhat as a 'cover page' for the other two move-in forms--the "Acknowledgement of Instructions" and the "Maintenance Inspection Report." To a considerable extent, it duplicates the information provided in the box on the lower right of the "Maintenance Inspection Report."

There are places on the form to type the name of the apartment complex ("Project Name") and the specific apartment ("Unit Address"). A line is provided for the resident to sign and date, certifying that the inspection report accurately reflects the conditions of the apartment. Also, a line is provided for the R.M. or P.M.S. to sign and date, certifying that the inspection report accurately reflects the conditions of the apartment and that any deficiencies disclosed in the report, OTHER THAN THE PERMANENT DAMAGE EXCEPTIONS LISTED ON THE BOTTOM OF THE FORM, will be remedied within 30 days of the date the resident moves into the apartment. Usually the rental manager supervises filling out all of the above information.

The "Exceptions - Permanent Damage" portion of the form usually is filled out by the inspecting maintenance worker during the inspection of the apartment with the new resident. These items are listed on the form in order to have a record of them so that at the time the resident moves out of the apartment s/he is not charged for these damages.

Steps of Sub-Task	Related Literacy Elements in Steps
III-1 Determine whether an item in the apartment is permanently damaged.	1.1 If in the course of completing the "Acknowledgement of Instructions" or the "Maintenance Inspection Report" a problem with an item is identified, ***utilize previous experience*** to determine whether the item can be repaired/serviced/replaced. 1.1.1 If the item can be repaired/serviced/replaced, ***record a description*** of the problem on the

"Maintenance Inspection Report." (For example, a hole in a window screen might require repairing the hole or replacing the entire screening in the screen.) *[Note: see separate task analysis.]*

1.1.2 If the item can't be repaired/serviced/replaced, or replacement is inappropriate because the problem is cosmetic or the cost of replacement is exorbitant (based on previous knowledge), ***decide to record*** the item on the "Inspection Certification" form. Examples of such items might include permanent stains on carpets, bad scratches on appliances, and cracks in patio concrete.

III-2 Record a brief description of the permanently damaged item(s) on the "Inspection Certification" form.

2.1 ***Scan*** the form to ***locate*** the area labeled "Exceptions - Permanent Damage."

2.2 In a very brief phrase ***describe the location*** of the item (if necessary) and ***summarize*** the nature of the problem with the item. (E.g., if there is a problem with the refrigerator, the location of the refrigerator need not be indicated. However, if there is a problem with a closet door, the room/area in which the closet is located needs to be indicated.) For example, if the bathroom door has been badly scratched by a previous resident's pet, the inspecting maintenance worker might write: "bad scratches on inside of full bath door."

III-3 Allow the new resident to suggest any additions to the permanent damage list and record these additions.	3.1 Respond to resident's suggestions of any additions to the permanent damage list.
	    3.1.1 ***Question*** the resident to ***determine*** what item is damaged and the nature of the damage to the item.
	    3.1.2 Perhaps ***reinspect*** the item to figure out how to describe the damage.
	    3.1.3 ***Summarize*** the nature of the damage to the item in a brief phrase.
	3.2 ***Question*** the resident to ***determine*** if s/he would like to include any other items on the permanent damage list.

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APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

6. USING TECHNICIAN'S MANUAL TO SOLVE ELECTRICAL PROBLEM

USING TECHNICIAN'S MANUAL TO SOLVE AN ELECTRICAL PROBLEM.

Task description:

Maintenance workers might refer to the technician's manual to help them perform a variety of repair and replacement tasks, such as repairing a stove, replacing a furnace switch, rewiring an electrical circuit. The technician's manual includes sections on electrical fundamentals, plumbing fundamentals, carpentry, grounds keeping, heating and air conditioning, and refrigerator, range, and dishwasher maintenance. The manual, which is contained in a large three-ring binder with sections separated by tabs, is 300 to 400 pages long and is numbered in sections with an alphabetical and numerical combination (e.g. page C-91 or TM-E-16h). Written material is in the form of prose, diagrams, schematics, conversion tables, numerical charts, photographs and other illustrations. Glick Management encourages worker familiarity with the technician's manual (as well as the maintenance manual) by administering an open-book test on the manual to each worker annually. Superintendents are required to update the manual periodically, using instructions and inserts sent to them by Glick Management.

Frequency performed: At the site at which this particular task was analyzed, the superintendent estimated that his staff refers to the maintenance manual 2 times each week. However, this site emphasized the use of literacy skills in performance of job tasks far more than any other site visited. In comparison, another superintendent indicated that his workers almost never refer to the maintenance manual except to complete the annual test.

Type of Material/Task

Prose	√ (read brief passages and lists of sequenced directions)
Document	√ (charts and schematics)
Quantitative	

Misc.:

- critical depending on the job task being performed and the ability of the worker to perform the task without reference to the manual
- manual supplied to all sites

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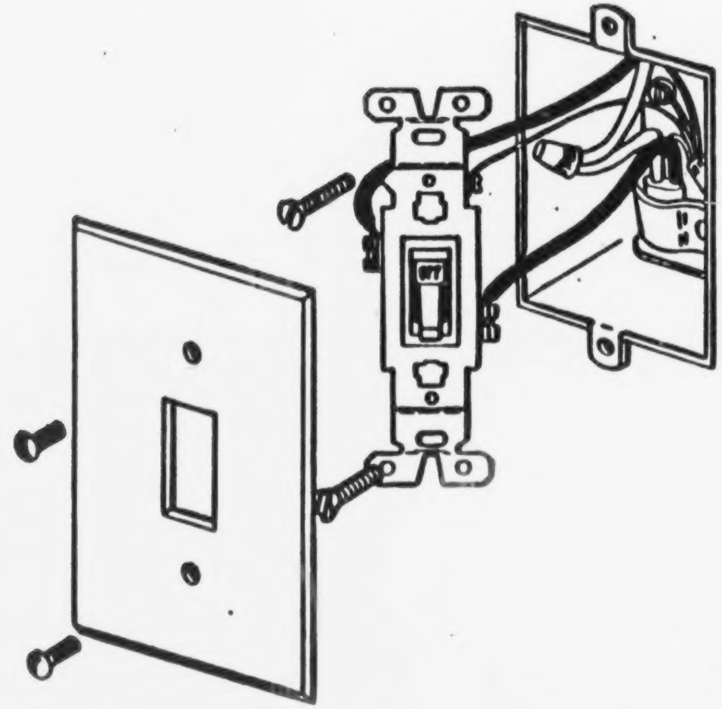


REPLACING SWITCHES

single-pole

When only one switch controls a light or wall outlet, you have a single-pole switch. They're the easiest switches to replace. These basic instructions will enable you to install any type of switch.

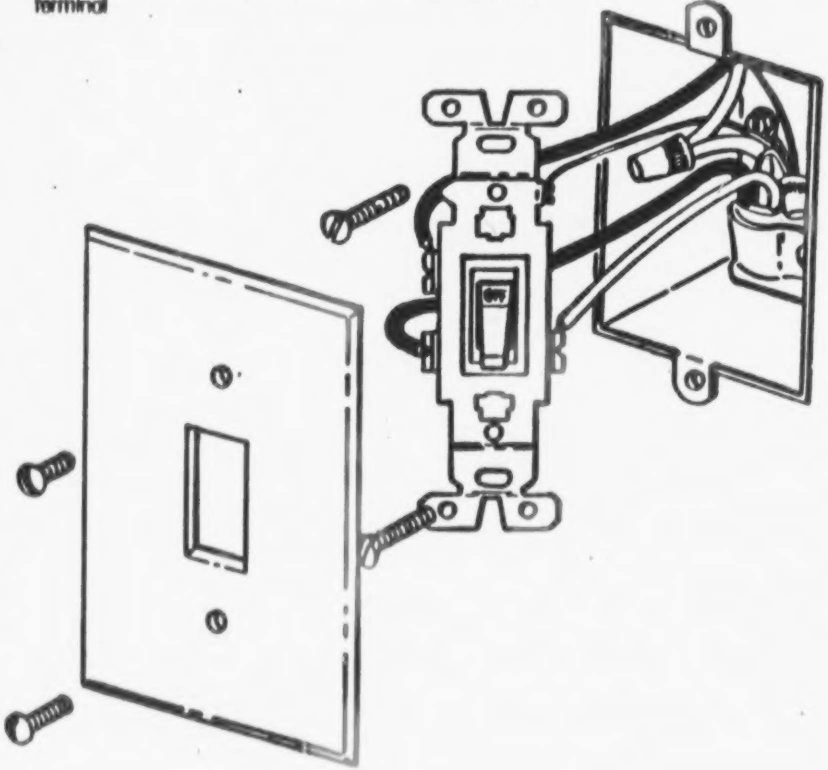
1. REMOVE FUSE OR TURN CIRCUIT BREAKER TO "OFF" BEFORE WIRING.
2. Remove wall plate and old switch.
3. Remove wires from old switch and reconnect to new switch in same manner.
4. Wrap each stripped wire clockwise 3/4 of way around screw. Or solid conductors may be inserted straight into a push-in terminal.
5. If bare (grounding) wire is connected to green hex head screw of old switch, reconnect to green hex head screw on new switch bracket or if no screw exists, fasten to metal box or metal switch bracket.
6. Mount the new switch in the box and replace wall plate.
7. Turn on power.

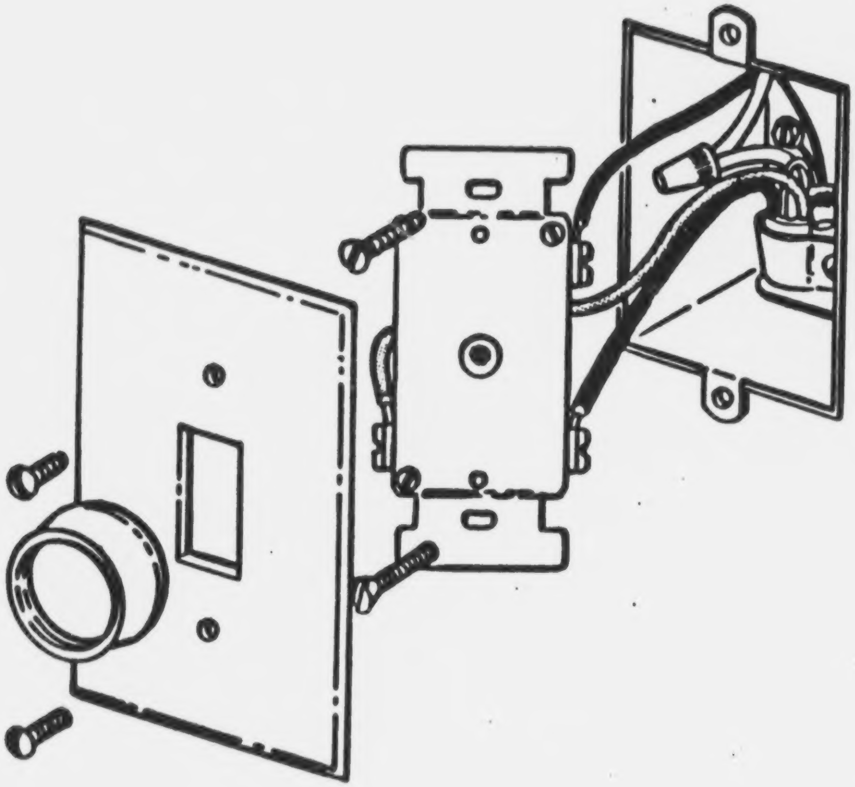
REPLACING SWITCHES

three-way

A three-way switch always works with another to control the same light or outlet, usually from opposite ends of a room or from the top and bottom of stairs. They're easy to identify because they have three wires running in them. You can get them in the common snap type, quiet type, and mercury type, which last indefinitely. These instructions apply to all three-way switches. Four-way switches are used with two three-way switches where the light is controlled from more than two locations.

1. REMOVE FUSE OR TURN CIRCUIT BREAKER TO "OFF" BEFORE WIRING.
2. Remove wall plate and old switch.
3. IDENTIFY AND REMOVE WIRE ATTACHED TO COMMON TERMINAL ON OLD SWITCH (screw of a different color from other two or marked common). Connect to copper screw or common terminal of the new switch.
4. Remove other two wires from old switch. Reconnect to the remaining screws of the new switch.
5. Wrap each stripped wire clockwise 3/4 of way around screw. Or solid conductors may be inserted straight into push-in terminals.
6. If bare (grounding) wire is connected to green hex head screw of old switch, reconnect to green hex head screw on new switch bracket or if no screw exists, fasten to metal box or metal switch bracket.
7. Mount new switch in the box and replace the wall plate.
8. Turn on power. If switches do not work properly you have probably connected the common wire to the wrong terminal.



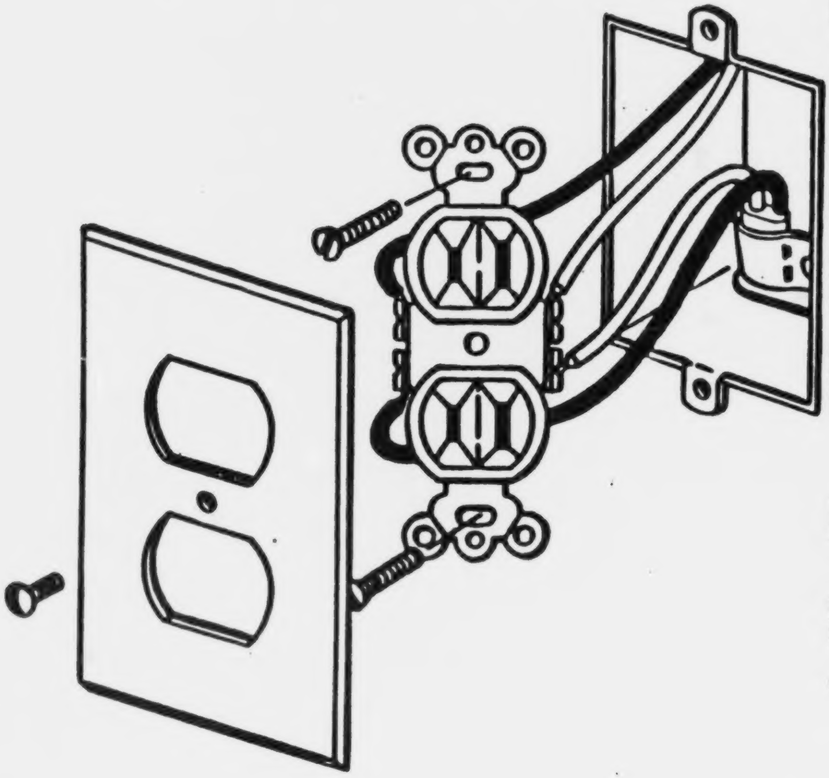


REPLACING SWITCHES

dimmer switches

Like any switch, dimmers are available in either single-pole (control from one location) or three-way (control from two locations). Determine which type is required and then follow the instructions for that type switch. In the three-way application, only one dimmer is required. The other control must be an ordinary three-way switch.

For safety, the dimmer bracket should be grounded. If the old switch has a ground wire (normally connected to green hex head screw), fasten it to the metal box. If the box is plastic, fasten the ground wire securely to the metal dimmer bracket.



REPLACING OUTLETS

two-wire outlets

Outlets are fast and easy to replace, as long as you pay careful attention to which color wire you attach to which terminal.

Most outlet installations have two sets of black and white wires. One set brings power in and the other set takes it out to other outlets farther down the line. The instructions here are for this type of arrangement; if you only find one set of wires attached to old outlet, just connect them to the new one according to the wire and terminal match-ups shown here.

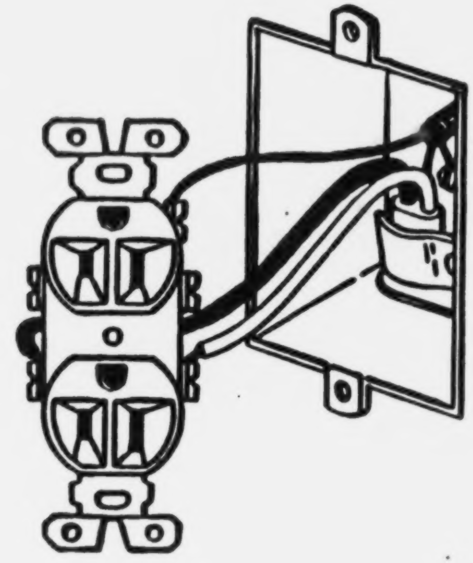
1. REMOVE FUSE OR TURN CIRCUIT BREAKER TO OFF BEFORE WIRING. USE A CIRCUIT TESTER TO MAKE SURE EACH OF THE TWO OUTLETS IS TURNED OFF (SOMETIMES EACH IS WIRED TO A DIFFERENT CIRCUIT).
2. Remove the wall plate screw and the plate.
3. Remove the outlet mounting screws.
4. Check the old outlet to see if there is a metal link between the two outlets or if it has been broken off. If it has been broken, snap off the one on the new outlet.
5. Remove the wires from the terminal screws.
6. If necessary, strip wire insulation back 1/2 inch. Prepare as indicated on the new outlet. Reform two clockwise loops in the ends.
7. Connect the black wires to the brass terminal and the white wires to the white terminal. Tighten securely.
8. Mount outlet in box and replace cover plate.
9. Turn on power.

REPLACING OUTLETS

three-wire grounding outlets

Electrical codes now require three-wire grounding outlets because of the added protection they give against the danger of electrical shock. They are simple to install and can be used to replace two-wire nongrounding outlets, PROVIDING THE BOX ITSELF IS GROUNDED. To determine this, see if a green or bare wire in the incoming cable is attached to the inside of the box. If it is, you can ground the outlet by connecting a short jumper wire between the ground wire and the green (ground) terminal on the grounding outlet, as shown here.

1. BE SURE YOU TURN OFF THE POWER BY REMOVING THE CORRECT FUSE OR TURNING THE CIRCUIT BREAKER TO OFF. Test both sides of the outlet with a neon circuit tester to be sure it has been completely disconnected.
2. Remove wall plate screw, wall plate, and outlet.
3. Check to see if break-off link has been removed. If it has, remove the same link on the new device before installing. Note and mark position and colors of wires connected to outlet being removed.
4. Unscrew terminal screws holding wires.
5. Connect green or bare wire to hexhead screw. Connect black wire to brass terminal and white wire to white terminal. Tighten securely. If break-off link has been removed, reconnect as marked in 3.
6. Replace outlet wall plate and screw.
7. Turn power back on and test outlet for power with lamp or circuit tester.



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TM-E-161

REPLACING OUTLETS

ground trip receptacles

This is a special outlet designed to give you and your family protection from certain kinds of electrical shocks. It functions just like an ordinary outlet until it senses trouble, then it turns off the power.

Ground fault protection is a smart idea wherever electricity is used near water, such as a bathroom, pool, or outdoors. It could save somebody's life. Consider making the investment.

There are two basic types of Ground Fault Receptacle, a "Feed-Thru" type and a "termination" type. The feed-thru has five wires and is connected in the branch circuit to provide not only protection to devices plugged into that receptacle, but all others further down that circuit. The termination type has only three wires and only protects the devices plugged into that receptacle. These instructions are for a "Feed-Thru" type of outlet. The only difference in installation is that you need not follow step 3 below. You should also carefully read the detailed instructions furnished with the replacement device.

1. REMOVE FUSE OR TURN CIRCUIT BREAKER TO OFF BEFORE WIRING. USE A CIRCUIT TESTER AND TEST BOTH SIDES OF THE OLD OUTLET FOR POWER BEFORE STARTING.

2. Remove wall plate and old outlet. Disconnect all wires.

3. Figure out which set of black and white wires in the box are "LINE" and which are "LOAD". Do this by connecting one set of black and white wires to the old outlet. Cap all loose wires with tape or a wire connector. Plug a lamp into the outlet and turn it on. Restore power to the circuit by turning the circuit breaker on. If the lamp lights, you have identified the line side wires. If it doesn't, TURN OFF POWER and repeat the process with the other set of black and white wires.

4. MAKE SURE POWER IS "OFF". Connect the black line side wire to the black wire marked "LINE" on the outlet.

5. Connect the white line side wire to the white wire marked "LINE" on the outlet.

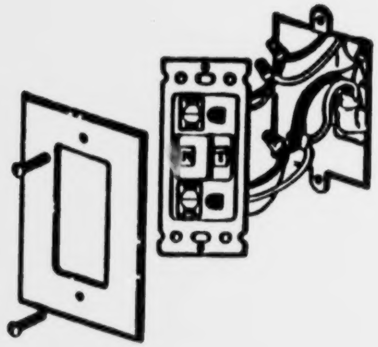
6. Group all other black wires and connect to black wire on outlet marked "LOAD".

7. Group all other white wires and connect to white wire on outlet marked "LOAD".

8. Connect the green or bare wire to the green wire on the outlet, or connect the green outlet wire to the outlet box. The box must be grounded. Check this by using a circuit tester to bridge between a black (hot) side wire and the box. If the light comes on brightly, the box is grounded.

9. Install the outlet and attach wall plate. Turn power on. The outlet is on when the reset button is pushed in.

10. To be sure that installation was correct, plug a lamp into the outlet and push test button. If the reset button pops out and the lamp stays on, you've probably wired the outlet backwards. TURN OFF POWER and recheck your work.



6

-9

TM-E-16m

REPLACING FIXTURES

Lighting fixtures usually come with detailed instructions on installing the hardware and on making the right electrical connections. There's nothing too difficult, just follow these instructions.

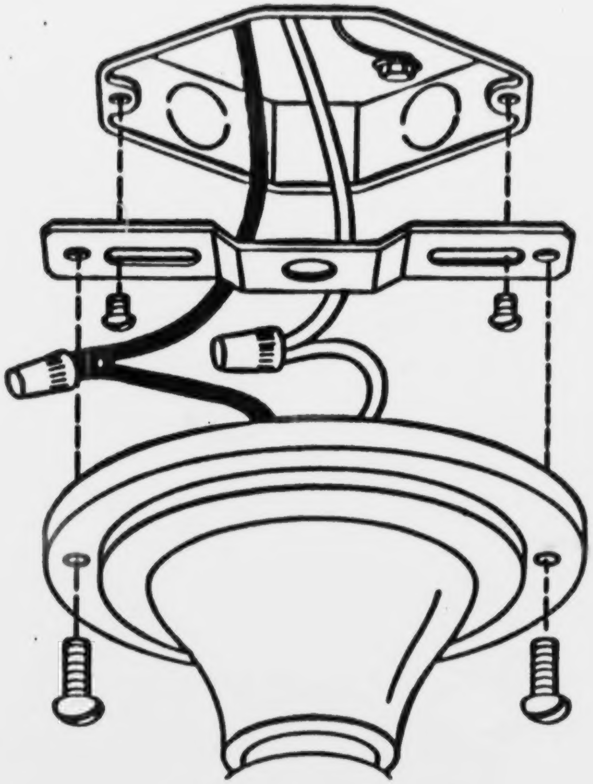
1. REMOVE FUSE OR TURN CIRCUIT BREAKER TO OFF BEFORE WIRING. MERELY SWITCHING OFF THE LIGHT AT THE WALL IS RISKY.

2. Remove the old fixture.

3. You may find three wires connected to the old fixture: a white (neutral) wire, black (hot) wire, and a green or bare wire.

4. Using twist-on wire connectors connect the white and black wires on the new fixture to the white and black wires coming from the ceiling. The green wire from the fixture should be connected to the bare ground wire or to the metal box.

5. Install the new fixture in the ceiling and switch on the power.



CEILING FIXTURE WIRING

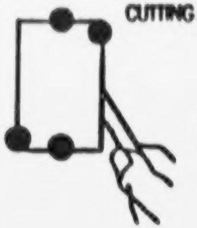
6 - 10

TM-E-16n

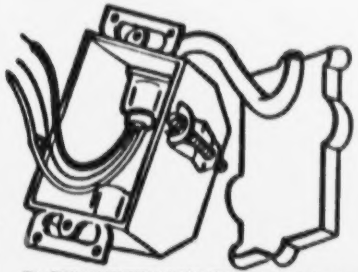
ADDING ON

mounting electrical boxes

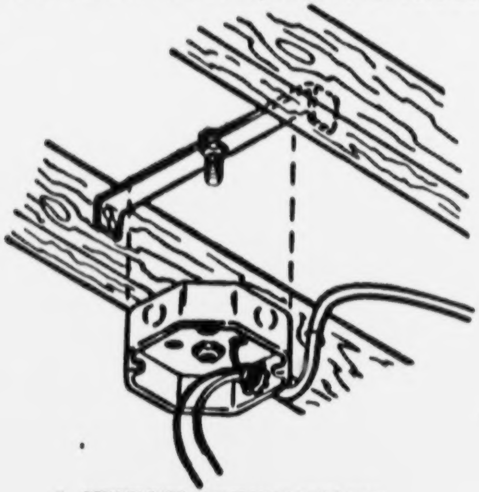
There are different types of electrical boxes and different ways to mount them, depending on your walls. Be sure the box you buy can be used with your type of wall construction, whether it's plaster and lath or dry wall. The illustrations show typical installations you may experience. To outline the hole to be cut, use the template supplied with the box or use the box to trace a cutting outline on the wall. Drill starter holes, cut around the outline with a key hole saw, then discard cutout.



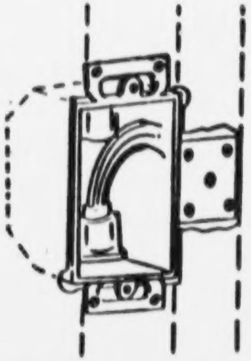
CUTTING A HOLE FOR AN ELECTRICAL BOX



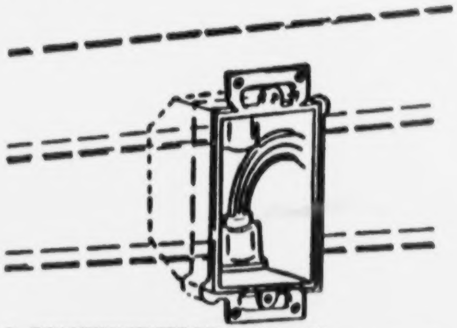
D BOX FITS DRY WALL OR PANEL AWAY FROM ANY STUDS.



A CEILING TYPE APPLICATIONS REQUIRE DEVICE FOR CLAMPING TO JOISTS.



B MOUNTING BRACKET ON BOX DESIGNED FOR FASTENING TO STUD.



C BOX DESIGNED FOR INSTALLATION IN WOOD LATH AND PLASTER WALL.

USING TECHNICIAN'S MANUAL TO SOLVE AN ELECTRICAL PROBLEM.

Steps of Sub-Task	Related Literacy Elements in Steps
1-1 Determine a purpose for referring to the technician's manual.	1.1 ***Identify a problem*** when performing a repair or servicing task whose solution might be found in the technician's manual. 1.1 Based on work being performed (e.g., repairing a 3-way electrical switch), ***decide*** to refer to the technician's manual because need more knowledge to complete the task. *[Note: the more familiar a worker is with the manual, the more likely s/he is to know whether the manual will be helpful to solve the problem encountered.]* 1.2 ***Formulate a question*** whose answer will help solve the problem. For example, "Why am I getting a partial voltage reading on a wire that is supposed to be dead?" *[Note: more experienced workers seem to find it easier (than do less experienced workers) to define a specific question whose answer will enable them to perform the necessary repair or servicing. Of course, a worker might define several questions s/he hopes to answer by referring to the manual.]* 1.2.1 Perhaps ***formulate*** one or more ***hypothetical answers*** to the question to 'test' by ***comparing*** with information from the manual. For example, a hypothesized answer to the above question might be "bleed back is occurring in the grounding wire through one of the switch boxes."
1-2 Locate the appropriate section of the technician's	2.1 ***Find*** the manual's table of contents by flipping through the beginning of the manual.

manual.

2.1.1 While turning pages, ***scan*** for the heading "Table of Contents."

2.2 ***Locate*** the appropriate section of the manual (the section likely to contain the answer to the question previously formulated) in the table of contents.

2.2.1 ***Determine*** what section heading to search for. For example, to answer the question "Why am I getting a partial voltage reading on a wire that is supposed to be dead?", the worker determined that the electrical section was the most appropriate place to look for the answer.

2.2.2 ***Skim*** the table of contents to locate the section heading (e.g., "electrical").

2.3 ***Attempt to determine*** the most appropriate subsection(s) of the manual to check for the answer to the question.

2.3.1 ***Skim*** the subheadings (e.g., "Replacing -- Switches" or Trouble Shooting -- Power Losses), comparing them to the question. ***Predict*** their likely contents in order to determine whether they might contain the answer to the question.

2.3.2 When have determined which subsection(s) to check for the answer to the question, locate the page numbers for the subsection to the right of the chosen subheading(s) and ***make a mental (or written) note*** of the page numbers.

2.4 ***Locate*** the chosen subsection(s) of the manual.

2.4.1 ***Skim*** the tabs in the manual and locate the desired section (e.g., "electrical"). Turn to the section.

2.4.2 ***Skim*** the page numbers on the pages in the section, ***matching*** the numbers noted to the numbers on the page, and ***locate*** the desired subsection(s). ***Check*** the subheading to be sure it is the subsection desired. Turn to the subsection (or the first subsection) to be searched.

1-3 Search for the desired information.

3.1 ***Skim*** the subsection(s) to locate the answer to the question.

- 3.1.1 Based on the question, ***isolate*** key words or phrases to search for. For example, key phrases for the question defined above might be "voltage drop," "bleed back," "partial voltage reading," "three-way switch," and "repairing light switches."
- 3.1.2 Search the text, ***scanning for key words*** or phrases, and using headings to help guide the search.
- 3.1.3 ***Scan diagrams,*** interpreting them to determine if they might be appropriate for answering the question.

3.2 When key words or phrases, or seemingly relevant diagrams, are encountered, ***switch from scanning to reading*** the text or closely ***examining*** the diagrams.

- 3.2.1 ***Apply the text information or diagram*** to the problem/question defined earlier in an effort to find the answer.
- 3.2.2 Perhaps ***select and synthesize information*** from various parts of the manual in an effort to create an answer to the question. For example, one might need to follow step-by-step directions to determine

which wires should be connected where when repairing a three-way switch. And, one might refer to a diagram of a switch in order to make sense of the directions.

I-4 Determine when the search for the desired information is completed.

4.1 ***Evaluate*** the information derived from the text and/or diagrams to determine whether it answers the question. *[Note: the more experience a worker has, the easier it will be for her/him to make this determination.]*

- 4.1.1 If the information does answer the question, ***make brief notes,*** if necessary, and/or go on.
- 4.1.2 If it does not answer the question, ***continue searching*** for the answer by ***skimming*** the text and diagrams. Perhaps skim subsections other than those originally chosen. Or, perhaps ***reformulate the question, isolate new key words/phrases, and skim the text again.***

4.2 Information encountered through this search process might be used to ***rule out answers*** the worker has hypothesized, even though the correct answer is not apparent. [Note: in our analysis of this task the worker never did find the answer to his question in the manual. However, his search did help him to eliminate a couple of his hypothesized answers.

4.3 ***Decide*** when to quit the search (when one believes has found the answer to the question or when one determines that the answer is not contained in the manual). [Note: the more familiar one is with the manual, and the better one's reading skills, the more likely one will feel confident relying on internal judgment as to when to quit searching for an answer.]

I-5 Apply the information found in the technician's manual to help solve the problem.

5.1 If an answer to the question was found, ***apply the information*** one acquired and stored (mentally or in notes) to perform the necessary repair or service.

5.1.1 Perhaps ***reinterpret information*** acquired when applying it. (For example, a diagram of a light switch might make much more sense or its meaning might change when one begins to work on an actual light switch.) [Note: A less experienced worker who has good basic reading skills (e.g., knowledge of how to use an index, how to read with a purpose, how to skim headings) probably would follow the same basic steps (described above) as would a more experienced worker. Obviously, the more familiar a worker is with the manual, the more quickly s/he can perform the process and the more likely s/he can take shortcuts. However, a worker with poor basic reading skills, regardless of her/his level of job experience, would not perform this task in the manner described above. In the worst case, s/he might simply pick up the manual, with only a vague sense of what information s/he is looking for, and begin to read it from cover to cover or to flip through it hoping (accidentally) to encounter the necessary information. This approach would likely be unsuccessful, cause the worker a great deal of frustration, and discourage her/him from consulting the manual in the future.]

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

7. CONDUCTING "SUMMERIZATION" OF APARTMENT COMPLEX

SUMMERIZING THE APARTMENT COMPLEX. Using the "Project Summerization Checklist."

Overall task description:

Each spring, the maintenance staff prepares the apartment complex for summer ("summerizes" the complex). This process entails a series of inspection, maintenance, and repair tasks. Some of the tasks are necessary to prepare the apartment complex for the summer months (e.g., fertilizing the lawns, preparing the swimming pool, adjusting lighting timers). Other tasks need to be performed routinely and are included in the summerization process, but aren't directly related to the demands of summer (e.g., checking balconies, cleaning the horseshoe orifices of ranges, testing smoke detectors).

A "Project Summerization Checklist" is provided in the apartment management company's "Maintenance Manual." The checklist serves two main purposes. First, it reminds the maintenance superintendent what tasks need to be completed as part of the summerization process. Second, it must be filled out, signed, and sent to the regional property manager to certify that the summerization process has been completed.

Two other forms are used in conjunction with the "Project Summerization Checklist" -- "Balcony Inspection Form" and "Filter and Smoke Alarm Control Log." Balcony inspection is included on the "Project Summerization Checklist" and is conducted as part of the winterization process as well. (See the literacy task analysis titled "Summerizing the apartment complex. Inspecting balconies." Smoke alarms are tested as part of both the summerization and winterization processes as well as two other times during the year.

The winterization process is very similar to the summerization process, although many of the specific tasks differ. (For example, pool equipment is put away rather than put out.) A "Project Winterization Checklist," following the same basic format as the summerization checklist, is included in the "Maintenance Manual." As noted above, both the "Balcony Inspection Form" and the "Filter and Smoke Alarm Control Log" are used in conjunction with the winterization checklist.

Frequency performed: Once each year, beginning in late April or early May (at the site at which the task was analyzed).

	Type of Material/Task
Prose	
Document	✓ (form)
Quantitative	

Misc.:

- important task (safety issues involved)
- task is performed at all sites
- maintenance assistants might perform the literacy task although maintenance superintendent retains primary responsibility for its completion

PROJECT SUMMERIZATION CHECKLIST

( ) AIR CONDITIONING units have had the filter changed, and the outside coil unit has been cleaned and all obstructions have been removed.

( ) BALCONIES have been checked to be sure that all handrails are secure.

( ) BALCONY AND PORCH HANDRAILS have been checked. Complete the Balcony Inspection Form retaining 1 copy and sending one copy to the RPM with the Summerization Checklist.

( ) FIRE ALARM systems have been checked.

( ) GUTTERS have been swept and clearned.

( ) HOSES have been made ready for use.

( ) HOT WATER HEATERS in apartments, townhouses and common areas have been set at the lowest normal level.

( ) LAWN AND PLANT CARE has been started by applying dertilizer, weed killer and additional seed where required.

( ) POOL EQUIPMENT is in place and operational.

( ) FIREPLACES should be checked for cresote buildup and damage.

( ) RANGES have had the horseshoe orifice cleaned.

( ) SILLCOCKS have had the handles replaced and ready for operation.

( ) SMOKE ALARMS have been tested.

( ) SNOW EQUIPMENT has been cleaned and stored.

( ) SPLASHBLOCKS have been tilted properly to allow water to flow away from the building.

( ) SWING SET EQUIPMENT has been repaired and made ready for use.

( ) TENNIS COURTS have been repaired and made ready for use.

( ) THERMOSTATS in all common areas, hallways walk-up basements, utility rooms, furnace rooms and laundry rooms have been turned off.

( ) TIMERS for common lighting have been adjusted for summer operation.

( ) WINTERIZATION signs have been removed and stored.

I spot checked the above items and found that the Project Summerization procedure was_____ was not _____ implemented.

DATED: ______________________________

PROJECT: ______________________________

____

I spot checked the above items and found that the Project Summerization procedure was _____ was not _____ implemented.

DATED: ______________________________

____
R P M SIGNATURE

MM-VI-16a

7 -2

SUMMERIZING THE APARTMENT COMPLEX. Using the "Project Summerization Checklist."

The "Project Summerization Checklist" is a printed page in the "Maintenance Manual" which the maintenance superintendent photocopies each year. It is printed back-to-back with a "Balcony Inspection Form." The checklist consists of twenty items presented in two columns. Next to each item is a space to check it off. There is an area at the bottom of the form for the maintenance superintendent to sign and date, indicating that the summerization process is completed. Similarly, there is an area at the bottom of the form for the regional property manager to sign and date.

Steps of Sub-Task	Related Literacy Elements in Steps
1-1 Read the checklist and recall or determine what tasks must be completed.	1.1 ***Skim or read*** the checklist. 1.1.1 ***Skim*** the key words, written in uppercase, in each item on the checklist. (Examples of key words include: "air conditioning," "balconies," and "fire alarm.") *[Note: Relatively experienced maintenance workers, who have completed the summerization process a couple times in the past, probably need only to skim the keywords describing each item in the list. Also, workers with low-level literacy skills, such as the worker interviewed about this task, might choose this option because they find it too difficult to read the entire descriptions.]* Or, 1.1.2 ***Closely read*** each item on the checklist. *[Note: Relatively inexperienced workers might choose this approach in order to familiarize themselves with the tasks that need to be completed.]* 1.2 ***Determine*** which tasks are relevant to

the apartment complex.

1.2.1 When skimming or reading the list, ***determine*** whether the task described must be performed depending on whether the apartment complex has the item requiring inspection, maintenance, or repair. For example, at the site at which we analyzed this task the items referring to a swimming pool, fireplaces, swing set equipment, and tennis courts were not relevant because the complex had none of these items. On the other hand, we did visit sites where every task on the checklist is relevant.

1.2.2 If a task is not relevant, ***choose*** to ignore it.

1.2.3 ***Make a mental note*** of each task that is relevant and must be completed.

1.3 For each item listed, ***recall or decide*** the specific process that must be completed.

1.3.1 ***Use the key word or description*** of the item to trigger a recollection of the specific subtasks entailed in completing each relevant item on the list. For example, an item reads: "Pool equipment is in place and operational." This task might entail a great variety of subtasks including: removing the pool cover, cleaning out the pool, servicing the water pump, filling the pool, assembling ladders and safety equipment, and so forth.

1.3.2 If unsure about the condition of an item (possibly needing repair), ***examine*** the item and ***determine*** what needs to be done. For example, an item reads: "Swing set equipment has been repaired and made ready for use." The maintenance superintendent might need to examine the equipment at each of the play areas and assess exactly what needs to be done (sand raked, swing chains repaired, swing seats replaced, etc.)

1.3.3 If uncertain about the subtasks entailed in completing a particular task, ***ask*** someone (e.g., another maintenance worker, the rental manager, the regional property manager) for help. [Note: The less experienced the maintenance worker, the more likely it is she/he might need help from someone when figuring out specific subtasks comprising a summerization task.]

1.4 ***Locate*** additional forms to be used during the summerization process.

1.4.1 When skimming or reading the form ***notice*** which other forms are needed (i.e., "Balcony Inspection Form" and "Filter and Smoke Alarm Control Log"). [Note: The "Balcony Inspection Form" is referred to explicitly in the checklist. However, one must rely on previous experience or help from another employee to know that one should use a "Filter and Smoke Alarm Control Log" when completing the item "Smoke alarms have been tested."]

1.4.2 ***Rely on previous knowledge or scan*** the maintenance manual table of contents to locate the page number on which the necessary forms are located.

1.4.3 ***Locate*** the form ***by matching*** the page number listed in the table of contents to the numbers on the pages in the manual.

1.4.4 ***Check*** the title of the form to be sure it is the correct one.

1-2 Plan to complete the relevant tasks listed.

2.1 ***Imagine*** the scope of each task to be completed.

  2.1.1 Based on previous experience completing the task and knowledge of the condition of the item to be repaired or serviced, ***envision or predict*** what steps it will take to perform the task.

2.2 ***Decide*** which worker(s) will complete each task.

  2.2.1 ***Determine*** how many workers are needed to perform each task. For example, it might be ideal to have two workers work together to prepare pool equipment for use. In contrast, perhaps only one worker is necessary for preparing hoses for use.

  2.2.2 Based on the demands of the task, the expertise of individual maintenance workers, workers' previous experience, and the number of people necessary to perform the task, ***decide*** which workers will perform each task. For example, the maintenance superintendent might decide to inspect balconies her/himself because it is a very important task and takes considerable expertise to perform correctly.

2.3 ***Estimate*** how much time it will take to complete each task.

  2.3.1 Based on previous experience and knowledge of the work abilities and habits of workers assigned to perform a particular task, ***estimate*** how long it will take to complete each task.

2.4 ***Make arrangements*** to subcontract any tasks that the maintenance staff does not (or can not) complete itself.

2.4.1 ***Plan*** to secure a subcontractor to perform any work not normally performed by the maintenance staff. For example, at the site at which we analyzed this task all lawn care is subcontracted.

2.4.2 ***Plan*** to secure a subcontractor to perform any repairs that the maintenance staff is unable to complete. For example, at one of the sites we visited a maintenance superintendent decided while conducting the summerization process that he needed to subcontract some major pool repairs.

2.4.3 ***Follow the appropriate procedures*** for hiring a subcontractor, if necessary. *[Note: See the task analyses "Filling out 'Request for Quotation' form for subcontracted repairs and maintenance" and "Evaluating bids for subcontracted repairs and maintenance."]*

2.5 ***Plan*** a rough schedule for completing the summerization process.

2.5.1 ***Determine*** any deadlines that must be met and are related to the summerization process. For example, most apartment complexes open their swimming pools by Memorial Day weekend; residents are informed of this opening date well in advance.

2.5.2 ***Prioritize*** tasks according to which are most urgent and which are most important. For example, the lawn care tasks might need to be completed relatively early in the summerization process in order to take full advantage of the growing season;

balcony inspections might need to be conducted relatively early if one has reason to expect that some serious problems might be identified.

2.5.3 Roughly ***schedule*** the tasks to be completed during the summerization process, taking into account the following factors: the priority attached to each task, the work hours required to complete the tasks, and the availability of the workers who will complete particular tasks. [Note: At the site at which this task was analyzed the summerization process was spread out over a month.]

I-3 Complete summerization tasks and check them off as they are finished.

3.1 After completing a task listed on the checklist, ***recall*** the key word(s) describing the task.

3.1.1 For example, for the task of cleaning and putting away snow removal equipment the key words are "snow equipment." (One might recall a close approximation, such as "snow removal.")

3.2 ***Scan*** the form to locate the task.

3.2.1 ***Scan*** the form, matching the recalled key word(s) to the key words in uppercase letters on the form.

3.3 ***Read*** the description of the task to be sure it is the correct one.

3.3.1 ***Recall*** a brief description of the task performed.

3.3.2 ***Read*** the task description, matching it to the recalled description of the task performed. If it is the correct task, go on to the next step. If it is not the correct task, continue to search the list.

3.4 ***Check off*** the task and note the date on which the task was completed.

3.4.1 ***Scan*** the first line of the task description and ***locate*** the blank area within the parentheses.

3.4.2 ***Place a check*** mark in the blank.

3.4.3 In the margin next to the parentheses ***write*** the date on which the task was completed. *[Note: There's no area clearly designated on the form for noting dates of completion. However, the maintenance superintendent we interviewed about this task indicated that he always dates each task (and checks it off).]*

I-4 Periodically consult the checklist to be sure no tasks are being skipped.

4.1 ***Skim*** the tasks not yet checked off on the checklist.

4.1.1 ***Scan*** the list of tasks, looking at the parentheses column.

4.1.2 Skip over the tasks already checked off.

4.1.3 ***Skim*** each task not yet checked off.

4.2 For each task not checked off, ***determine*** whether it still needs to be completed.

4.2.1 ***Recall*** whether each task not yet checked off is relevant to the apartment complex.

4.2.2 ***Assess*** whether work is already underway on the task.

4.3 ***Plan*** to complete any relevant tasks not yet begun. (See the steps described above under I-2.)

I-5 When all tasks are completed, if necessary, inspect work.

5.1 ***Examine*** the list of tasks, recalling which workers performed each task.

5.2 ***Mentally note*** any tasks one did not perform oneself or directly supervise.

5.2.1 ***Note*** any tasks that maintenance workers performed on their own. For example, a maintenance assistant might have been assigned to adjust all thermostats in common areas on his own.

5.2.2 ***Note*** any tasks that were subcontracted. For example, a lawn care service might have been hired to spray fertilizer and herbicide on lawn areas.

5.3 ***Inspect*** any tasks one did not perform oneself or directly supervise.

5.3.1 Perform spot inspections on all work identified in the step above. For example, one might randomly choose to check a couple thermostats to be sure they were set properly. Similarly, one might check a couple lawn areas for evidence of fertilizer and herbicide.

5.3.2 If any problems are found (e.g., a task has been performed incompletely or incorrectly) during inspection, take steps to remedy the problem. (For example, inspect the task more thoroughly to identify other problems, assign or hire someone to remedy the problem, or perform the task oneself.)

I-6 Sign and date the form.

6.1 ***Scan*** the form to locate the area to be filled out by the maintenance superintendent.

6.1.1 ***Scan*** the form to find the area in the lower left corner. [Note: There is no clear indication on the form that this area is to be completed by the maintenance superintendent. Thus, a relatively inexperienced worker might need assistance to figure out that she/he is supposed to fill out this section.]

6.2 ***Check off*** the correct blank in the statement provided.

6.2.1 ***Scan*** the area and locate the statement "I spot checked the above

6.4.4 ***Write*** today's ***date*** on the line.

[Note: A couple summerization tasks listed on the form are difficult to understand. For example, one item reads, "Balconies have been checked to be sure that all handrails are secure." Another item reads, "Balcony and porch handrails have been checked." The maintenance superintendent we interviewed about this task indicated that the former item refers to balconies in common areas and the latter item refers to balconies in individual apartments. The wording of these items easily could be clarified. Also, there are several misspellings and typing errors on the form.]

7 -12

items and found that the Project Summerization procedure was _____ was not _____ implemented."

- 6.2.2 If all work has been performed and inspected, ***place a check*** in the first blank area in the statement.
- 6.2.3 If all work has not been performed satisfactorily, ***place a check*** in the second blank area in the statement. *(Note: A maintenance superintendent probably would check this blank only if a major problem was uncovered that couldn't be addressed during the summerization process. Such a problem would probably entail hiring a subcontractor through a competitive bid process. For example, routine efforts to prepare tennis courts for operation might reveal the need to have them completely resurfaced. Depending on budgetary constraints this task might need to be deferred until well after the summerization process has been completed. (If a minor problem was uncovered, the maintenance superintendent would have it corrected before filling out the form.))*

6.3 ***Fill in*** the name of the apartment complex.

- 6.3.1 ***Scan*** this area of the form and locate the blank line labeled "Project."
- 6.3.2 ***Fill in*** the name of the apartment complex on this blank line.

6.4 ***Sign and date*** the form.

- 6.4.1 ***Scan*** this area of the form and ***locate*** the blank line at the bottom of the area. (It is not labeled.)
- 6.4.2 ***Sign your name*** on this line.
- 6.4.3 ***Scan*** this area of the form and ***locate*** the blank line labeled "Dated."

SUMMERIZING THE APARTMENT COMPLEX.
Inspecting balconies.

Overall task description:

Balconies are inspected each spring and fall in conjunction with the summerization and winterization processes. (See the literacy task analysis titled "Summerizing the apartment complex. Using the 'Project Summerization Checklist.'") All parts of each balcony are inspected to determine whether they are in good condition, or need painting, caulking, and/or repairs. Every balcony located in the complex (in both common areas and individual apartments) is inspected.

The "Balcony Inspection Form," provided in the apartment management company's "Maintenance Manual," is used to record the results of the balcony inspection. It is sent to the regional property manager along with the summerization (or winterization) checklist. The purpose of the form is to prove that each balcony was inspected and to indicate specific maintenance or repairs that need to be performed.

Frequency performed: Twice each year, spring and fall

	Type of Material/Task
Prose	
Document	√ (form, including a chart)
Quantitative	

Misc.:
- important task (safety issues involved)
- task is performed at all sites
- maintenance assistants might perform the literacy task although maintenance superintendent retains primary responsibility for its completion

BALCONY INSPECTION FORM

Project / Phase: Date:
PMS:

Type of Deck Surface: __ Plywood, __ Tongue & Groove, __ Nealon,
__ Concrete, __ Other ___________________

Indicate Condition: OK - Good Condition, P - Needs painting,
C - Needs Caulking, R - Needs repair

Apt Number	Hand-Railing	Deck Surface	Flashing	Facia/Trim	Ceiling	Floor Joists
SAMPLE 2110 C	OK	OK	C	C & P	P	OK

Explain plan of action for all items needing repair, painting, or caulking. Include a schedule for the work to be done and an estimate of the cost. (* Loose handrails require immediate repair. Any dangerous condition requries immediate attention.)

____
____
____
____
____
____

Distribution: Maintenance File, RPM with summerization / winterization checklist.

SUMMERIZING THE APARTMENT. Inspecting balconies.

The "Balcony Inspection Form" is a printed page in the "Maintenance Manual" which the maintenance superintendent photocopies each time it is used (twice per year). It is printed back-to-back with the "Project Summerization Checklist" and the "Project Winterization Checklist." Information provided on the "Balcony Inspection Form" is organized in four main areas. First, at the top of the form is an area in which to record basic information about the apartment complex. Second, two keys are provided to use in describing the type of deck surface used on the balconies and the condition of each balcony inspected.

Third, there is a chart to be filled out by the inspecting maintenance worker. Each row of the chart is to be used to describe a particular balcony. In the columns of the chart the inspector records the apartment number in which the balcony is located and the condition of each part of the balcony (i.e., hand railing, deck surface, flashing, facia/trim, ceiling, and floor joists). Fourth, at the bottom of the form the maintenance worker describes specific plans for maintaining and repairing balconies found to be in need of attention. A note at the bottom of the form indicates that copies are to be distributed to the maintenance file and to the regional property manager.

Steps of Sub-Task	**Related Literacy Elements in Steps**
II-1 Fill in basic information requested on the top of the form.	1.1 ***Fill in*** the name of the apartment complex and the number of the phase. 1.1.1 ***Scan*** the top of the form and locate the area labeled "Project/Phase." 1.1.2 In this area ***write*** the name of the apartment complex and the number of the phase to be inspected. [Note: Apartment complexes we visited had as many as three phases. The phases are usually noted by Roman numerals (e.g., "Woodbridge I").] 1.2 ***Write*** the name of the apartment complex's maintenance superintendent. 1.2.1 ***Scan*** the top of the form and locate

the area labeled "PMS."

1.2.2 ***Interpret*** "PMS" to mean "project maintenance superintendent."

1.2.3 ***Write*** the name of the apartment complex's maintenance superintendent in the space provided. [Note: Usually the maintenance superintendent fills in this section of the form her/himself, although another maintenance worker might help conduct the balcony inspections.]

1.3 ***Fill in*** the date(s) of the inspection.

1.3.1 ***Scan*** the top of the form and locate the area labeled "Date."

1.3.2 In this area, ***write*** the date(s) on which the balcony inspections are being conducted.

II-2 Indicate the type of deck surface used on balconies in the apartment complex.

2.1 ***Recall*** (or ***check***) the type of surface used on the apartment complex's balconies.

2.1.1 Based on past experience, ***recall*** the type of surface used on the balconies.

2.1.2 Or, ***consult*** another worker (a maintenance worker with previous experience or the rental manager) or a completed "Balcony Inspection Form" in the files to find out the type of surface used.

2.1.3 Or, ***examine*** a balcony to determine the type of surface used. [Note: Maintenance workers with relatively little experience might rely on the latter two tactics.]

2.2 ***Scan*** the list of surface types and identify the type used on the balconies.

2.2.1 ***Scan*** the list of surface types, matching them to the type used on the balconies.

2.2.2 ***Locate*** the type of surface used (if it is one of the types listed.) [Note: The types listed are: "plywood;"

"tongue & groove;" "Nealon;" and "Concrete."]

2.3 ***Check*** the type of surface used.

2.3.1 ***Locate*** the blank area in front of the type of surface used on the balconies.

2.3.2 ***Place a check*** in the blank area.

2.4 Or, ***indicate*** the ***type*** of surface in the blank provided.

2.4.1 If the type of surface used on the balconies is not one of the types listed, ***scan*** the form and ***locate*** the term "other."

2.4.2 ***Locate*** the blank are in front of the term "other."

2.4.3 ***Place a check*** in the blank area.

2.4.4 ***Locate*** the blank line following the term "other."

2.4.5 ***Write*** a brief phrase describing the type of surface used on the balconies (e.g., "asphalt").

II-3 Examine the table to figure out how to complete it.

3.1 ***Note*** the headings for each column in the table.

3.1.1 ***Notice*** that each balcony is described in a series of columns.

3.1.2 ***Read*** the headings listed for each column. [Note: The headings are: "Apt number;" "Handrailing;" "Deck surface;" "Flashing;" "Facia/trim;" "Ceiling;" and "Floor joists."

3.1.3 ***Figure out*** the meaning of each heading. For example, figure out exactly what area of the balcony constitutes the flashing. [Note: Relatively experienced maintenance workers rely on previous experience to interpret these terms. Maintenance workers with relatively little experience might need assistance from the maintenance superintendent or another worker to figure out exactly what parts are included under each heading.]

3.2 ***Interpret*** the code used for describing the condition of each part of each balcony.

  3.2.1 ***Scan*** the form and locate the section headed "Indicate condition."

  3.2.2 ***Figure out*** that this section provides a code to use in describing the condition of each of the parts of the balcony. For example, the phrase "OK - Good Condition" means that one should write "OK" in the column if the part of the balcony listed in the column heading is in good condition. *[Note: No explicit directions are provided for interpreting the code.]*

  3.2.3 ***Read*** each of the four terms and their corresponding codes.

  3.2.4 ***Determine criteria*** for interpreting each of the terms. For example, determine exactly what it means to say that a part of a balcony needs painting (Does it need painting if the paint is merely faded? If it is cracked? If it is peeling?). *[Note: The term "Needs repair" perhaps requires the most elaborate interpretation. The inspecting maintenance worker needs to formulate a mental list of specific things to examine for each of the balcony's parts. The more experience maintenance workers have, the easier they find this task.]*

3.3 ***Look over*** the sample entry provided on the table.

  3.3.1 ***Scan*** the table and locate the sample balcony description provided.

  3.3.2 ***Read and interpret*** the description of the balcony, checking one's understanding of the code for indicating the condition of each part of the balcony.

3.3.3 ***Notice*** that more than one condition may be noted in a given column for a specific balcony. For example, the sample balcony description indicates that the facia/trim needs both caulking and painting. However, no other code can be used in combination with "OK" since by definition this term means that no work needs to be performed.

II-4 Inspect each balcony and record the condition of each of its parts.

4.1 ***Identify and record*** the apartment number in which the balcony is located.

4.1.1 ***Figure out*** the number of the apartment in which the balcony is located either by: relying on memory; checking the address and number posted on the apartment; or looking at a map of the apartment complex.

4.1.2 ***Scan*** the table and locate the column labeled "Apt Number."

4.1.3 ***Record*** the number of the apartment (usually a street address, sometimes in combination with a letter designating the particular apartment at the address) in the column. For example, the apartment number of the sample balcony described on the table is "2110 C."

4.2 ***Inspect and record*** the condition of each part of the balcony.

4.2.1 ***Inspect*** the parts of each balcony in some order. *[Note: A relatively inexperienced worker probably relies on the order provided on the table, reading from left to right. However, a more experienced worker might inspect the parts in some other order* *that she/he finds convenient.]*

- 4.2.2 For each of the parts of the balcony, ***determine*** how to describe its condition. ***Ask*** oneself a series of ***questions*** when making the determination. (For example, one might ask: Is the paint peeling on this part? Is the caulking cracked or missing? Does this part seem sturdy and fastened securely?)
- 4.2.3 ***Review*** the list of codes for indicating the condition of the parts when deciding how to describe each part.
- 4.2.4 ***Scan*** the form and ***locate*** the column in which this part is listed. For example, if one is inspecting the railing, locate the column labeled "Handrailing."
- 4.2.5 In the column (and in the row corresponding to the balcony's apartment number) ***write*** the code(s) describing the condition of the part. For example, if the handrailing is in need of repair and painting, write "R & P" in the "Handrailing column" in the row corresponding to the apartment number of the balcony being described.

4.3 ***Repeat*** this process for each balcony in the complex.

4.4 ***Reevaluate*** the interpretation of the code for indicating the condition of each part.

- 4.4.1 When determining the condition of the parts of each balcony, reexamine the interpretation of the rating code decided above; refine criteria so they can be applied easily and consistently. For example, before beginning the inspection a maintenance worker might decide that deck surfaces with faded paint would not be considered in need of repainting. However, while inspecting balconies the worker might change her mind and decides that very faded deck surfaces will be deemed to be in need of repainting.

II-5 Provide plans for performing necessary maintenance and repairs.

5.1 ***Read*** the directions at the bottom of the form.

- 5.1.1 ***Scan*** the form and locate the area below the table.
- 5.1.2 ***Read*** the directions for filling in this section.

5.2 ***Formulate plans*** for performing necessary maintenance and repairs.

- 5.2.1 ***Decide*** which problems constitute "dangerous conditions." Include any necessary handrail repairs in the list of "dangerous conditions."
- 5.2.2 ***Prioritize*** tasks, giving "dangerous conditions" top priority.
- 5.2.3 ***Determine*** what purchases are necessary to perform each task. For example, if one already has brushes, plan to purchase paint in order to paint deck surfaces. *[Note: Contractors might need to be hired to perform major tasks.]*
- 5.2.4 ***Estimate*** the cost for performing each task. For example, if ten deck surfaces are in need of repainting and it takes a half gallon of paint to provide two coats on each one, calculate (by multiplying 10 times .5) that five gallons of paint are necessary. Obtain a price for the paint to be used (e.g., $7.00 per gallon) and calculate (by multiplying 5 times $7.00) that the total cost of

the paint to be used is $35.00.

- 5.2.5 ***Plan*** a time schedule for performing the necessary tasks. Take into account the following considerations: the amount of time necessary to complete each task; other work tasks that need to be accomplished during the time period; the availability of maintenance workers or subcontractors who will perform the tasks.

5.3 ***Summarize*** plans for performing necessary maintenance and repairs.

- 5.3.1 ***Scan*** the form and locate the blank lines provided toward the bottom.
- 5.3.2 In this area ***summarize*** the "action plan" for completing each task. For each task include: a brief description of the task; the approximate dates when the work will be completed; and, an estimate of the cost to complete the task. For example, an entry in this area might read, "Paint 10 deck surfaces (2 coats) - first week in May - $35.00."

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

8. CONDUCTING ANNUAL RECERTIFICATION INSPECTIONS FOR SUBSIDIZED APARTMENTS

ANNUALLY INSPECTING SUBSIDIZED APARTMENTS TO RECERTIFY THEM.

Task description:

Subsidized apartment units (elderly, handicapped, and low-income apartments) are required to be inspected each year in order to "recertify" them. The purposes of the inspection are: (1) to ensure that residents are complying with various rules and requirements (e.g., demonstrating good housekeeping, not having pets, not having wall-to-wall carpeting); (2) to ensure that the apartment complex is complying with various requirements (e.g., furnishing a working smoke detector, maintaining balconies and patios in good repair); and (3) to determine what repairs need to be made in apartments. A recertification inspection is performed on an apartment once a year, at the time the lease is up for renewal.

Frequency performed: once each year for each subsidized apartment unit (e.g., the site at which we analyzed this task performs over 300 such inspections each year, averaging around 25 each month.

Type of material/task: prose (limited summary writing); document (form, charts)

Misc.:
- very important at sites with subsidized units
- used at all sites with subsidized units

8-1

ANNUAL UNIT INSPECTION REPORT

Project Name: Carriage House North

Resident Name:

Unit Address: Bldg/Unit #:

REPAIRS/COMMENTS (No comment indicates in good order)

LIVING/DINING AREA
- Front Screen Door
- Security Lock
- Front Door
- Windows
- Window Screens
- Guest Closet
- Walls
- Vents & Registers
- Floors
- Patio Screen Door
- Patio Door
- Ceiling
- Carpet

KITCHEN
- Range
- Hood & Exhaust Fan
- Refrigerator
- Cabinets
- Counter Tops
- Sink
- Floors
- Walls
- Light Fixtures
- Vents & Registers
- Windows
- Window Screens
- Garbage Disposal
- Ceiling
- Carpet

Check Personal History Record (if applicable) inside cabinet door next to refrigerator.

Yes ____ No ____

BATHROOM	Full Bath	Half Bath
Mirror		
Medicine Cabinet		
Lavatory		
Commode		
Bathtub/Shower		
Walls		
Floor		
Towel Bars		
Paper Holder		
Shower Curtain Bar		
Window		
Window Screens		
Vents & Registers		
Light Fixtures		
Door		
Ceiling		
Carpet		

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RM-G-8 (Rev. 4/88)

REPAIRS/COMMENTS (Continued)

FURNACE/WATER HEATER ROOM

Check for fire hazards

Storage of Combustibles

Storage near Water Heater

Other

BEDROOM	1	2	3	4
Light Fixtures				
Closets				
Walls				
Floor				
Windows				
Window Screens				
Vents				
Door				
Ceiling				
Carpet				

HALLS	Down	Up
Closets		
Walls		
Floors		
Light Fixtures		
Smoke Alarm		
Ceiling		
Washer/Dryer Area		
Carpet		
Stairway		
Smoke Detector		

PATIO

Fence/Railing

	Yes	No	N/A
EMERGENCY CALL SYSTEM CHECKED			
FIRE SIGN POSTED			
WATERBED			
PET (Describe)			

HOUSEKEEPING - - - - - - - Satisfactory ______ Unsatisfactory ______

GENERAL COMMENTS:

Inspector's Signature

Inspection Date

Annual Unit Inspection Report

The form used to guide and report the results of recertification inspections is titled "Annual Unit Inspection Report." Its format requires the inspecting maintenance worker to fill in blanks, write brief comments, and utilize charts to write comments or to check off items.

I-1 Fill out the top section of the form, identifying the apartment unit to be inspected.

1.1 Locate the space for "Project Name" and write down the name of the apartment complex.

1.2 Locate the space for "Resident Name" and with information obtained from the rental manager write down the name of the resident whose apartment is to be inspected.

1.3 Locate the space for "Unit Address" and with information obtained from the rental manager write down the 'street/mailing' address of the apartment.

1.4 Locate the space for "Bldg/Unit #."
1.4.1 Ask supervisor or rental manager for the building/unit number corresponding to the 'street/mailing' address of the apartment to be inspected, or,
1.4.2 Scan map of apt. complex, locate the number of the building corresponding to the street address, and apply the 'formula' to determine unit number. [Note: Apartments are assigned unit numbers so that keys can be labeled in such a way that if stolen they would be very difficult to use to enter an apt. The building/unit number is composed of the building number, recorded on maps and blueprints, and a number for the apartment in the building. There is a system for determining the latter based on the location of the apartment in the building. Workers interviewed found it difficult to explain this system and seemed to rely mainly on the rental manager for obtaining unit number.]

I-2 Inspect each individual room and area of the apartment, recording the results of the inspection.

2.1 Inspect each item listed for each room/area in the apartment. (Rooms/areas listed include "Living/Dining Area," "Kitchen," "Bathroom," "Furnace/Water Heater Room," "Bedroom," "Halls," and "Patio.") [Note: there is no explanation on the form as to what the inspecting maintenance worker is supposed to do or look for when inspecting a particular item. For example, for the item labeled "Bathtub/Shower" in the "Bathroom" section, a worker might check the faucets for leaks, look for evidence of previous seepage around a shower, check for loose tiles, look for mildewed caulk. It seems that the more experienced the worker is, the more likely s/he is to have a 'repertoire' of problems to look for when inspecting an item on the list. Less experienced workers might spend much longer looking at or testing an item without knowing what kind of problems to be looking for.]

2.1.1 Scan and locate the space by the item being inspected. [Note: Inexperienced workers seem more likely than experienced workers to follow the form from the top to the bottom, front side to back, when conducting their inspection. This might require retracing one's footsteps several times over when conducting an inspection. Experienced workers, including the maintenance assistant we interviewed for this task, seem more likely to skip around on the form when conducting their inspection. They seem more likely to rely on their own mental 'check list' or to inspect items as they encountered them while strolling through the apartment. For example, the maintenance assistant we interviewed first checks the dead bolt on the front door, next looks to see if the resident has added wall-to-wall carpeting, and then checks to see if the resident has a pet. Thus, experienced workers have to scan the form more thoroughly to locate the item being inspected; however, they are also more familiar with the form.]

2.2 If the item being inspected (e.g., the patio door, or the kitchen ceiling) is in good order (does not need repair), leave the space by the item blank.

2.3 If the item being inspected is in need of repair,

2.3.1 Briefly describe what is wrong with it and/or summarize what repairs are needed. For example, when inspecting the range (labeled "Range" under the "Kitchen" section) the maintenance worker might discover that the oven light does not work. S/he might write "oven light not working" in the space provided by the item "Range."

2.3.2 This step might entail asking oneself such questions as: "What might I need to do to fix this problem?" and "Where have I seen this problem before and how did I fix it then?"

2.3.3 Also, the inspecting worker might rely on previous knowledge and experience when locating a problem with a specific item to help her/him determine what related problems might exist and, hence, what other items to inspect extra closely. For example, if s/he notices a stain on a downstairs ceiling, s/he might inspect for a leak in the bathroom plumbing.

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2.4 In units assigned to elderly residents, look inside the cabinet door next to the refrigerator to be sure the resident has a "Personal History Record" posted.

2.4.1 If it is posted, locate the "Yes" space and place a check in it.

2.4.2 If it is not posted (and should be), locate the "No" space and place a check in it.

2.5 Interpret the charts included in the inspection form to determine where to write comments pertaining to specific items inspected.

2.5.1 In the "Bathroom" section, make sense of a two-column chart to record summary comments about items in both the "Full Bath" and the "Half Bath" (or only the full bath if there is no half bath).

2.5.2 In the "Bedroom" section, make sense of a four-column chart and determine how many columns to use (one for each bedroom) to record summary comments about items in each bedroom (columns are labeled "1," "2," etc.).

2.5.3 In the "Halls" section, make sense of a two-column chart to record summary comments about items in the downstairs and upstairs hallways (columns are labeled "Down" and "Up").

I-3 Utilize the chart on the bottom half of the back of the form to record inspection of special items (i.e., emergency call system, fire sign, waterbed, and pet).

3.1 Make sense of a three-column chart and check the appropriate box to indicate whether the emergency system was checked. (Columns are labeled "Yes," "No," and "N/A.")

3.1.1 This step includes interpreting the meaning of the column labeled "N/A" ("not applicable") and knowing when it is the appropriate response.

3.2 Use the same chart (with all three options--"Yes," "No," and "N/A" to record whether a fire sign is posted. Again, if fire sign is not present in the apartment, must know whether it is required in order to choose between "No" and "N/A" as the correct response.

3.3 Use the same chart (with only "Yes" and "No" as options) to record whether the resident has a waterbed, by checking the correct box.

3.4 Use the same chart (with only "Yes" and "No" as options) to record whether the resident has a pet, by checking the correct box.

3.4.1 Write a brief description of the pet (e.g., "large black dog") in the space provided.

I-4 Assess the general housekeeping habits of the resident and record if satisfactory or not.

4.1 Relying on own judgment, based on own standards or standards picked up from co-workers, decide whether the tenant's general housekeeping is "Satisfactory" or "Unsatisfactory."

4.1.1 Locate and put a check in the space by the appropriate category.

I-5 Record any general comments based on the inspection.

5.1 This step might entail synthesizing impressions of the state of the apartment and summarizing them in general comments, usually written in phrases. For example, inspecting maintenance worker might note "lots of unnecessary wear and tear throughout apartment."

5.2 Also, an inspecting maintenance worker might explain an item checked elsewhere on the form, summarizing her/his observations. For example, s/he might comment in explanation of poor housekeeping noted above "kitchen very dirty with bugs; bathroom filthy."

I-6 Sign and date the form.

6.1 Scan the form to locate the section labeled "Inspector's Signature" and sign own name.

6.2 Scan the form to lcoate the section labeled "Inspection Date" and record today's date (when the inspection is completed).

I-7 Write up "Service Request" forms for specific repairs that need to be made in the apartment.

7.1 [Note: See the task analysis titled "Responding to Requests For Service On Apartments" for a detailed description of this task.]

7.2 Inspecting maintenance worker determines which, if any, of the repairs necessary constitutes an emergency based on whether is potential danger to resident (patio railing is loose), might result in damage to the apartment (toilet is overflowing), or is in violation of a requirement (i.e., smoke detector doesn't work).

7.2.1 Maintenance worker performs these tasks immediately her/himself or has another worker perform them.

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

9. FILLING OUT "SERVICE WORK ORDER"
SUBCONTRACTED REPAIRS AND MAINTENANCE

FILLING OUT "SERVICE WORK ORDER" FORM FOR SUBCONTRACTED REPAIRS AND MAINTENANCE.

Overall task description:

Every time an apartment complex has a subcontractor perform repair or maintenance work a "Service Work Order" form must be completed. Generally, most of the form, including a description of the services to be performed and the cost for those services, is filled out and signed (by the maintenance worker authorizing the work and the subcontractor who will perform the work) prior to the start of the work. This form serves as a contract, binding both the apartment management company and the subcontractor to its terms (regarding the services to be performed, costs of services, starting and finishing dates, and subcontractor liability).

If the cost of the work exceeds a certain amount, it must be authorized by the regional property manager prior to being performed. If the cost of the work exceeds $1000, a competitive bid process must be completed before a subcontractor is awarded a contract (see the literacy task analyses titled "Filling out 'Request for Quotation' form for subcontracted repairs and maintenance" and "Evaluating bids for subcontracted repairs and maintenance").

The form is signed again by the maintenance worker authorizing the work (usually the superintendent) and the subcontractor, indicating that the work has been satisfactorily performed and payment should be authorized. The form is sent to the regional property manager who must sign it if the cost of the work exceeds a certain amount ($500). Then, it is forwarded to accounting and the subcontractor is paid for the services performed.

Frequency performed: The site at which we analyzed this task completes between 12 and 15 "Service Work Order" forms each week. This site is one of the oldest complexes owned by the apartment maintenance company, it subcontracts a relatively large amount of work (compared to other complexes we visited), and it has a large number of units. Thus, this estimate might be high compared to many of the other sites we visited.

	Type of Material/Task
Prose	
Document	√ (form)
Quantitative	√ (calculating prices for services)

Misc.:

- very important task (legally binding and often involving large amounts of money)
- task is performed frequently and at all sites
- at some sites, including the one at which we analyzed it, task is sometimes performed by maintenance assistants

PROJECT NAME

WORK ORDER NO. W092561

THIS NUMBER MUST APPEAR ON ALL INVOICES AND STATEMENTS

IMPORTANT
INVOICE IN DUPLICATE & MAIL TO:

GENE GLICK MANAGEMENT CORP.
ACCOUNTS PAYABLE DEPT.
P.O. BOX 40177
INDIANAPOLIS, IN 46240

SUBCONTRACTOR

SERVICE WORK ORDER

This work shall be started no later than ______________ and completed on or before ______________.

1. CLEANING ☐ CARPET-REG ☐ STEAM ☐
4. PAINTING ☐ DRYWALL REPAIR ☐
2. EXTERMINATING ☐
5. REPAIRS - DW ☐ RANGE ☐ REFRIG. ☐
3. LAWN SERVICE ☐
6. OTHER REPAIRS OR SERVICE ☐
7. Work Scope and Specifications ☐

TYPE OF SERVICE	APARTMENT ADDRESS	APT. #	BLDG. #	PROJ. PHASE #	UNIT SIZE		DOLLAR AMOUNT
					BR	TH	
NON-CONTRACT WORK NOT TO EXCEED $100.00 WITHOUT REGIONAL SUPERVISOR'S APPROVAL.					TOTAL COST		

8. The above work is hereby authorized — VOID — MANAGEMENT SIGNATURE — DATE

9. Subcontractors Acceptance — VOID — NAME & TITLE — DATE

10. Service has been completed with the following exceptions: — VOID — CONTRACTOR SIGNATURE — DATE

11. Above described service has been completed satisfactorily and payment is authorized. — VOID — MANAGEMENT SIGNATURE — DATE

12. Regional Maint/Regional Manager/Division Manager Approval (if necessary) — SIGNATURE — DATE

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*Subcontractor agrees to comply with the conditions set forth on the reverse side of this form which are incorporated herein, provided, however, the insurance requirements in paragraphs (b) and (c) shall not be applicable unless the Total Cost of this Service Work Order exceeds $1,500

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MAINT. WORK ORDER FILE

GBGM 107

PROJECT NAME

WILLIAMSBURG NORTH

WORK ORDER NO. W09256

THIS NUMBER MUST APPEAR ON ALL INVOICES AND STATEMENTS

IMPORTANT
INVOICE IN DUPLICATE & MAIL TO:

GENE GLICK MANAGEMENT CORP.
ACCOUNTS PAYABLE DEPT.
P.O. BOX 40177
INDIANAPOLIS, IN 46240

SUBCONTRACTOR

HAROLD SHAFFER
2612 HARRIS DR
INDPLS IN 46219

SERVICE WORK ORDER

This work shall be started no later than ____________ and completed on or before ____________.

1. CLEANING ☐	CARPET-REG ☐	STEAM ☐	
2. EXTERMINATING ☐			
3. LAWN SERVICE ☐			
4. PAINTING ☒	DRYWALL REPAIR ☒		
5. REPAIRS - DW ☐	RANGE ☐	REFRIG. ☐	
6. OTHER REPAIRS OR SERVICE ☐			
7. Work Scope and Specifications ☐			

TYPE OF SERVICE	APARTMENT ADDRESS	APT. #	BLDG. #	PROJ. PHASE #	UNIT SIZE		DOLLAR AMOUNT
					BR	TH	
VACANT PAINT	4511 COMM. WEALTH	B			2BR		80 00
" "	6263 COMM. WEALTH CT.					2TH	95 00
5 ROOM EXTRA COAT	" "						50 00
DRYWALL REPAIR 4HS.	" "						48 00
VACANT PAINT	6265 COMM. WEALTH CT.					2TH	95 00
3 ROOMS EXTRA COATS	" "						30 00
DRYWALL REPAIR 3 HR.							36 00
NON-CONTRACT WORK NOT TO EXCEED $100.00 WITHOUT REGIONAL SUPERVISOR'S APPROVAL						TOTAL COST	434 00

8. The above work is hereby authorized ____ SUPERINTENDENT SIGNATURE DATE 3/21/

9. Subcontractors Acceptance Harold Shaffer NAME & TITLE DATE 3-21-

10. Service has been completed with the following exceptions:

Harold Shaffer CONTRACTOR SIGNATURE DATE 3-21-

11. Above described service has been completed satisfactorily and payment is authorized ____ SUPERINTENDENT SIGNATURE DATE 3/21/

12. Regional Maint/Regional Manager/Division Manager Approval (if necessary) ____ SIGNATURE DATE ____

*Subcontractor agrees to comply with the conditions set forth on the reverse side of this form which are incorporated herein, provided, however, the insurance requirements in paragraphs (b) and (c) shall not be applicable unless the Total Cost of this Service Work Order exceeds $1,500

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MAINT. WORK ORDER FILE

GBGM 107

HAROLD SHAFFER -
2612 AURIE DR.
INDPLS IN 46219
PHONE - 898-7745

305901

CUSTOMER'S ORDER NO. ____ DATE 3/26/89

SOLD TO Williamsburg North

ADDRESS ____

SHIP TO ____

ADDRESS ____ (Painting)

SOLD BY	CASH	C.O.D.	CHARGE	ON ACCT.	MDSE. RET'D.	PAID OUT	SHIP VIA	PREPAID ☐ COLLECT ☐

	QUANTITY	DESCRIPTION	PRICE	AMOUNT	
1	4511-	B. Commonwealth Dr. 2 BRm		80	00
2	6263	Commonwealth Ct. 2 TH.		95.	00
3	two	Coats		50.	00
4	dry	Wall repair 4 hrs.		48.	00
5	6265	Commonwealth Ct. 2 TH.		95.	00
6	two	Coats		30.	00
7	dry	Wall repair 3 hrs.		36.	00
8			$	434.	00
9					
10					
11					
12					
13					
14					

All claims and returned goods MUST be accompanied by this bill.

RECEIVED BY ____ DELIVERED BY ____

GRAYLINE FORMS [illegible] DUPLICATE – [illegible] TRIPLICATE U.S.A.

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FILLING OUT A "SERVICE WORK ORDER" FOR SUBCONTRACTED REPAIRS AND MAINTENANCE.

The "Service Work Order" form consists of several identical sheets (except for the designation at the bottom, indicating the use for that particular sheet), separated by carbon paper. All information written on the top sheet transfers to the other sheets. Generally, all of the form, except for items 10, 11, and 12, is filled out before the subcontracted work is completed. Usually, the maintenance superintendent (or a maintenance assistant acting in her/his place) complete all of the form except for the two areas where the subcontractor signs and dates the form (before and after) the work is performed.

Terms of agreement are preprinted on the back of the "Service Work Order" form. The subcontractor agrees to these terms when she/he signs the front of the form before beginning work. A note on the bottom of the front of the form reads: "Subcontractor agrees to comply with the conditions set forth on the reverse side of this form which are incorporated herein, provided, however, the insurance requirements in paragraphs (b) and (c) shall not be applicable unless the Total Cost of this Service Work Order exceeds $1,500." Most of the terms refer to the subcontractor's liability during and after performing the contracted work.

Steps of Sub-Task	Related Literacy Elements in Steps
1-1 Complete the basic information at the top of the form.	1.1 ***Fill in*** the name of the apartment complex 1.1.1 ***Scan*** the form and locate the box labeled "Project name." 1.1.2 In the box, ***write*** the name of the apartment complex at which the work is to be completed. 1.2 ***Indicate*** the name and address of the subcontractor to perform the work. 1.2.1 ***Scan*** the form and locate the area labeled "Subcontractor." 1.2.2 ***Determine*** the name and address of the subcontractor through one of the following methods: have the

subcontractor (if present) dictate her/his name and address; look up the information on an old billing statement (submitted by the subcontractor); look up the information on an old "Service Work Order;" find the name and address in a Rolodex; look up the name and address in the phone book.

1.2.3 In the space provided, ***write*** the name and address of the subcontractor. *[Note: An inexperienced worker might not know exactly what information to provide in this area since the four lines provided are not labeled separately. The size of the area and knowledge about the purpose of the form (to enable the accounting department to bill the subcontractor once the work has been performed) might serve as hints that an address is required.]*

1.3 ***Determine*** the start and completion dates for the work.

1.3.1 Based on discussion with the subcontractor and/or previous experience, ***estimate*** how many days it will take to complete the work.

1.3.2 Based on discussion with the subcontractor concerning the apartment complex's needs as well as the subcontractor's schedule, ***decide*** on the latest possible starting and finishing dates for the work. *[Note: These dates might be later than the dates during which the work is actually performed.]* For example, if the work to be subcontracted is interior apartment painting, the apartment complex might have to have the work completed within a week so a new resident can move in on a specified date. If the work takes three days to complete, the maintenance superintendent will need to be sure that the subcontractor is available to begin work no later than three days before the resident is scheduled to assume occupancy.

1.3.3 ***Scan*** the form and locate the statement "This work shall be started no later than ______ and completed on or before ______."

1.3.4 In the first blank in the statement ***fill in*** the latest possible starting date.

1.3.5 In the second blank in the statement ***fill in*** the latest possible finishing date. *[Note: The completed "Service Work Order" that we analyzed left the dates area blank. The maintenance worker interviewed indicated that it was not filled out because the form was completed after the subcontracted work was performed; thus, the dates were irrelevant. It seems that the form was not filled out before the work was performed because the work was very routine (painting and drywall repair), because the apartment complex had extensive previous experience with the subcontractor, and because the cost of the work was low enough that approval was not required from the regional property manager.]*

1.4 ***Check*** the box describing the type of work to be performed.

1.4.1 ***Form a mental description*** of the

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nature of the work.

1.4.2 ***Scan*** the boxes labeled "1." to "7." ***Determine*** the meaning of each descriptive phrase. For example, item 1. provides three boxes, labeled "cleaning," "carpet-reg," and "steam." The maintenance worker must interpret the meaning of each box. The "cleaning" box refers to general cleaning of a vacant apartment. The "carpet-reg" box refers to non-steam carpet cleaning processes. The "steam" box refers to steam cleaning of carpets. *[Note: Other phrases in this list require the interpretation of abbreviations (i.e., "DW" and "refrig.").]*

1.4.3 ***Decide*** whether the work indicated matches the mental description of the work to be subcontracted and check each applicable box. *[Note: More than one box may be checked. For example, on the completed "Service Work Order" that we analyzed two boxes were checked -- "painting" and "drywall repair."] [Note: The maintenance worker interviewed about this task did not know under what conditions item "7." ("Work scope and specifications") is supposed to be checked.]*

1-2 Fill out the table describing the type of work to be performed and the location of the work.

2.1 ***List*** each address at which work is to be performed.

2.1.1 ***Scan*** the table to locate the "Apartment column.

2.1.2 On separate lines (rows) within the column, ***list*** (in abbreviated form, if necessary) each apartment address (street address) at which work is to be performed. (For example, an entry on the sample form reads "4511 Comm.Wealth").

2.2 ***Fill in*** information describing each apartment at which work is to be performed.

2.2.1 For each address listed, first ***locate the column*** labeled "Apt. #." In that column (in the same row as the address) ***note*** the number or letter of the apartment. For example, for the above address the apartment letter "B" is provided.

2.2.2 For each address listed, next ***locate the column*** labeled "Bldg. #" and ***note*** the building number corresponding to the address. *[Note: On the completed "Service Work Order" that we analyzed this column was left blank. Apparently the maintenance worker filling out the form decided that building numbers were not necessary. This information might have been deemed redundant since the building number is derived from the street address.]*

2.2.3 For each address listed, ***locate the column*** labeled "Proj. phase #." If relevant, ***indicate*** in which phase of the complex the apartment is located. *[Note: This column is relevant only at complexes consisting of more than one phase and supervised by the same maintenance superintendent.]*

2.2.4 For each address listed, ***locate the column*** labeled "Unit size." Based on familiarity with the apartment or a blueprint map, ***determine*** whether the apartment is a "flat" (located on one floor, usually with a communal entrance from outdoors) or a

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townhouse (more than one story with a separate entrance). If it is a flat, ***write*** the number of bedrooms it has in the subcolumn labeled "BR." If it is a townhouse, ***write*** the number of bedrooms it has in the subcolumn labeled "TH."

2.3 ***Summarize*** the type of work to be performed at each apartment.

2.3.1 For each address listed, ***determine or recall*** exactly what work will be performed at that particular apartment. This process might entail visiting the apartment alone or with the subcontractor. For example, the subcontractor might need to determine whether an item needs to be repaired or replaced. In the case of the completed "Service Work Order" that we analyzed the painting subcontractor visited the apartments to determine whether more than one coat of paint was necessary.

2.3.2 ***Locate the column*** labeled "Type of service."

2.3.3 ***Summarize*** in a brief phrase each of the work subtasks to be performed at each address listed. The summary might include the number of rooms in which the subtask is to be performed at a particular address. An example of a subtask summary is: "5 room extra coats."

2.3.4 On separate rows (corresponding to the apartment address), ***write the summarized description*** of each work subtask. (A given address might have two or three subtasks described for it and thus might take up two or three rows.) For example, on the completed form we analyzed each address has three subtasks listed -- drywall repair for a specified number of rooms, painting, and extra coats of paint for a specified number of rooms.

I-3 Determine and calculate the cost of the work to be performed.

3.1 ***Determine*** the unit cost (usually based on number of rooms involved) for each subtask listed on the table.

3.1.1 ***Look up*** the subcontractor's unit charge for the particular task on an old bill or "Service Work Order," or on a price list supplied by the subcontractor. *[Note: At the site at which we analyzed this task subcontractors' price lists were posted on the desk and walls in the maintenance superintendent's office.]* Or, ***ask*** the subcontractor for his unit price for a particular task. For example, a painting subcontractor generally charges a set price for applying a second coat of paint to a room.

3.2 For each subtask listed, ***multiply*** the unit cost by the number of units (usually the number of rooms in the apartment) to ***arrive at a total cost*** for the subtask.

3.2.1 ***Determine*** how many "units" (usually rooms) are to be worked on at the address. (Usually this information has been listed either in the "Unit size" column or in the description of the subtask (if not every room in the apartment is involved in the subtask). (For example, a two bedroom apartment might consist of five rooms. The subtask description might indicate that drywall is to be repaired in four of the rooms.)

3.2.2 ***Multiply*** the unit cost by the number of units involved in the subtask. For example, a painter might charge $10 to apply a second coat of paint to a room. A subtask description might indicate that a second coat of paint is to be applied in five rooms. Thus, the cost for the subtask is determined by multiplying $10 by 5 (rooms).

3.3 ***Record*** the cost of each subtask listed on the form.

3.3.1 For each subtask, ***locate*** the space in the row under the column labeled "Dollar amount."

3.3.2 In that space, ***record*** the cost for the subtask (determined above).

3.4 Complete these steps for each of the subtasks listed.

3.5 ***Calculate the total cost*** for the work to be subcontracted.

3.5.1 ***Add*** all of the figures listed in the "Dollar amount" column. *[Note: Generally, this task is performed using a calculator.]*

3.5.2 ***Locate*** the box labeled "Total cost" at the bottom of the "Dollar amount" column.

3.5.3 In that box, ***record*** the sum of the "Dollar amount" column.

I-4 Sign and date the form.

4.1 ***Sign and date*** the form yourself.

4.1.1 ***Scan*** the form to ***locate*** line "8.," labeled "The above work is hereby authorized."

4.1.2 ***Scan*** across the line and locate the area labeled "Superintendent signature." Sign your name in that space.

4.1.3 ***Scan*** across the line and locate the area labeled "Date" and fill in today's date.

4.2 Have the subcontractor sign and date the form.

4.2.1 ***Scan*** the form to ***locate*** line "9.," labeled "Subcontractors acceptance."

4.2.2 ***Scan*** across the line and ***locate*** the area labeled "Name & title." Have the subcontractor sign her/his name and note her/his title in this space.

4.2.3 ***Scan*** across the line and ***locate*** the area labeled "Date" and fill in today's date.

1-5 After the work has been performed, review the cost of the work and complete the bottom of the form.

5.1 If relevant, ***note*** any work originally envisioned as part of the contract but not completed.

5.1.1 ***Scan*** the form to ***locate*** line "10.," labeled "Service has been completed with the following exceptions."

5.1.2 In this area ***record a summary*** of any work that could not be completed. For example, a painter might find that she could not paint a room in an apartment because it turned out that another subcontractor had to be brought in to replace drywall that could not be repaired. *[Note: Presumably the price for the subcontracted work has to be adjusted to reflect the reduced scope of the work.]*

5.2 Have the subcontractor sign and date the form.

5.2.1 ***Scan*** the form to ***locate*** line "10.," labeled "Service has been completed with the following exceptions."

5.2.2 ***Scan*** across the line and ***locate*** the area labeled "Contractor Signature." Have the subcontractor sign her/his name and note her/his title in this space.

5.2.3 ***Scan*** across the line and ***locate*** the area labeled "Date" and ***fill in*** today's date.

5.3 ***Sign and date*** the form yourself.

- 5.3.1 ***Scan*** the form to ***locate*** line "11.," labeled "Above described service has been completed satisfactorily and payment is authorized."
- 5.3.2 ***Scan*** across the line and ***locate*** the area labeled "Superintendent signature." ***Sign your name*** in that space.
- 5.3.3 ***Scan*** across the line and ***locate*** the area labeled "Date" and ***fill in*** today's date.

[Note: According to company policy, steps 1-1 through 1-4 (described above) are completed before the subcontracted work is performed. However, in practice, these steps often are completed after the work has been finished. If the work is routine, the subcontractor has worked for the complex in the past, and no higher-level approval is necessary, the "Service Work Order" often is filled out after the subcontracted work has been performed. In this case, the pertinent information often is copied from the subcontractor's billing statement onto the form.]

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

10. APPLYING CHECKLIST FOR "SERVICE WORK ORDERS" FOR SUBCONTRACTED REPAIRS AND MAINTENANCE WORK WHEN COSTS EXCEED CERTAIN DESIGNATED AMOUNTS

USING A CHECKLIST FOR SERVICE WORK ORDERS OVER $1000.

Overall task description:

For subcontracted repairs and maintenance costing more than $1000, the maintenance superintendent must conduct a competitive bid process. (See the literacy task analyses "Filling out 'Request for Quotation' form for subcontracted repairs and maintenance," "Evaluating bids for subcontracted repairs and maintenance," and "Filling out a competitive bid form.") To help guide this process, the apartment management company's "Maintenance Manual" contains a form titled "Maintenance Superintendent's Checklist for Service Work Orders Over $1000."

This form lists the steps the maintenance superintendent must follow in conducting the competitive bid process. The maintenance superintendent is not required to complete this form as part of the process. Rather, it is provided to assist her/him and can be used in slightly different ways. First, when the maintenance superintendent is new to the job, she/he can use this form to learn the steps in the competitive bid process. Second, she/he can skim it before initiating the competitive bid process for a specific project in order to refresh her/his memory about the steps to follow. Third, she/he can make a photocopy of the form and use it as a log throughout the competitive bid process. Used in this manner, it serves as a record (including dates) of each step of the process. This last use of the form is the task analyzed below.

Frequency performed: A maintenance superintendent might use this form each time she/he conducts a competitive bid process (around 6 times each year at the site where we analyzed this task). (This number varies considerably from site to site depending on how old the complex is and how much work is subcontracted rather than performed by the maintenance staff.) In general, the more experience a maintenance superintendent has with the competitive bid process, the less likely it is she/he will use this form.

	Type of Material/Task
Prose	√ (paragraphs included in the form)
Document	√ (form)
Quantitative	

Misc.:

- important task (large sums of money involved), especially for less experienced maintenance superintendents
- task is potentially performed at all sites
- task is performed by maintenance superintendents and rental managers (very rarely, if at all, by maintenance assistants)

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MAINTENANCE SUPERINTENDENT'S CHECKLIST FOR SERVICE WORK ORDERS OVER $1000

Purpose: The Service Work Order is a legal contract between the project and the contractor. It is an agreement that states the work to be done and the legal requirements of the contractor and the project. In the case of conflicting opinions, the Service Work Order is the basis for resolving the difference. It is important that the Service Work Order (SWO) be completed and signed by both parties before work begins and upon completion of the work.

Project Maintenance Superintendent's Responsibilities:

	Completed	Date
1. PMS receives from the RPM:		
a. "Checklist"		
b. Competitive Bid Form		
c. Request for Quotation		
d. Work Scopes and Specifications		
2. PMS completed the Service Work Order		
3. PMS meets with contractor and both sign the SWO. (Determines and states on the SWO the start and completion dates.) PMS gives a copy of the SWO to the sub-contractor. The PMS must not sign the "Contractors Proposals".		
4. PMS sends a xerox copy of the SWO to the RPM. The RPM is to match a copy of the SWO to her copy of the competitive bid form to ensure that the PMS has assigned the SWO properly and to show that the contractor agreed to the terms of the SWO before the work began.		
5. Upon completion of the work, the contractor agains signs the SWO to show that the work is completed. Work not yet completed should be explained on the SWO.		
6. PMS inspects work and signs SWO if work is not satisfactory. If work is not satisfactory, he should explain the reasons on the SWO.		

USING A CHECKLIST FOR SERVICE WORK ORDERS OVER $1000.

The form labeled "Maintenance Superintendent's Checklist for Service Work Orders Over $1000" is contained in the "Maintenance Manual." It consists of an introductory paragraph, describing the purpose of the Service Work Order and a list of steps under the heading "Project Maintenance Superintendent's Responsibilities." Some of the steps are described in a paragraph. The steps are presented in a chart format. The first column lists the responsibilities (steps). The second column is labeled "Completed" and serves as a place for the maintenance superintendent to check off each step as it is finished. In the third column (labeled "Date") the maintenance superintendent records the date when the step is completed.

Steps of Sub-Task	**Related Literacy Elements in Steps**
I-1 Skim the form and formulate a purpose for reading the form more closely.	1.1 ***Skim*** the form. 1.1.1 ***Notice*** abbreviations that must be figured out to make sense of the form. (For example, "SWO," "PMS," and "RPM.") 1.1.2 ***Note*** that the form is organized in two main sections -- "Purpose" and "Project Maintenance Superintendent's Responsibilities." 1.2 ***Figure out*** the format of the form. 1.2.1 ***Notice*** that the bulk of the form consists of a list of numbered steps which the maintenance superintendent is expected to follow when completing "Service Work Orders" for over $1000. 1.2.2 ***Determine*** that one is expected to check off "responsibilities" in the "Completed" column. *[Note: The format of the form is not explained. The use of the "Completed" column is especially vague.]* 1.2.3 ***Determine*** that one is expected to

record the date when each responsibility is fulfilled in the "Date" column.

1.3 ***Formulate questions*** to answer when reading the form more closely.

1.3.1 ***Formulate questions*** about the information contained in the form. For example, prereading questions might include: Who is the rpm? When do I sign the "Service Work Order?" When does the rpm get a copy of the "Service Work Order?" What should I do if the subcontracted work isn't completed satisfactorily?

1.3.2 ***Formulate questions*** about how to use the form. For example, such questions might include: Am I obligated to fill out this form every time I fill out a "Service Work Order" for work costing over $1000? Should I fill out the form all at once or at different times?

1-2 Read the form closely, looking for answers to questions.

2.1 ***Figure out*** the meaning of the abbreviations used on the form. [The meaning of "SWO" ("Service Work Order") is given. The meaning of "PMS" (project maintenance superintendent) can be inferred fairly easily. The meaning of "RPM" (regional property manager) must be determined based on previous knowledge.]

2.2 ***Read*** the "Purpose" section of the form. [Note: This section describes the practical and legal uses of the "Service Work Order, and emphasizes the need for the contractor and maintenance superintendent to complete and sign the form before and after the work has been performed.]

2.2.1 ***Look for answers*** to prereading questions. For example, the answer to the question "When do I sign the

"Service Work Order?" is found in this paragraph, as well as in the list below.

2.2.2 ***Mentally note key ideas*** to remember. (For example: The "Service Work Order" is a legal contract. It is used to settle disputes. It must be signed before and after work is performed by both the contractor and the maintenance superintendent.)

2.2.3 ***Monitor comprehension and figure out*** any passages that don't make sense at first. *[Note: The wording of the section is fairly sophisticated and would be difficult for a low-skilled reader.]* (For example, the term "project" is used to refer to the apartment complex at which the maintenance superintendent works. At the sites we visited this term was not commonly used this way in speaking about the apartment complex. Thus, its meaning might be somewhat obscure in this passage.)

2.3 ***Read*** the "Project Maintenance Superintendent's Responsibilities" section of the form. *[Note: This section lists each of the steps the maintenance superintendent should follow regarding the competitive bidding process.]*

2.3.1 ***Look for answers*** to prereading questions. For example, the answers to the following questions are found in this section: When do I sign the "Service Work Order?" When does the rpm get a copy of the "Service Work Order?" What should I do if the subcontracted work isn't completed satisfactorily?

2.3.2 ***Mentally note key ideas*** to

remember. (For example: Note each of the steps outlined. Note that the regional property manager receives a copy of the "Service Work Order" before work has begun. Note the list of documents that the maintenance superintendent must copy and file before the originals are sent to the accounting department.)

2.3.3 ***Monitor comprehension and figure out*** any passages that don't make sense at first. (For example, the maintenance superintendent should read each responsibility listed as a step in the competitive bid process. She/he might make reference to previous or subsequent steps in order to understand a particular step.) *[Note: The more familiar a maintenance superintendent already is with the competitive bid process, the easier it is to use this form. Someone unfamiliar with the process might find it difficult to understand the written descriptions of each step. A new worker might need help from an experienced employee (another maintenance superintendent, the rental manager, or the regional property manager) in order to understand exactly what it is she/he must do. At the very least, she/he would need to look at a "Service Work Order" (preferably one that has been completed) in order to understand specific references to it.]*

2.4 ***Decide*** how to use the form during the competitive bid process.

2.4.1 ***Figure out*** how the chart is structured. ***Notice*** that the responsibilities (steps) are described in a chart composed of three columns.

2.4.2 ***Ascertain*** what information should be recorded on the form. ***Notice*** that there is space to check (in the "Completed" column) and date (in the "Date" column) each step (and several substeps) described.

2.4.3 ***Decide*** when to record information on the form. For example, one might decide to check and note the date for each step as one completes it (particularly if one is unfamiliar with the process or form). Or, one might decide to wait until the end of the process and then check off the steps to be sure none has been left out. (A worker very familiar with the process might choose this option.) Realize that one is not required to use this form (although one is required to complete each of the steps described therein). *[Note: The maintenance superintendent we interviewed about this task, who is very bright and experienced, indicated that he no longer uses the form at all (although he did use it when he was less experienced).]*

2.4.4 ***Think about other uses*** for the form besides recording information. For example, one might decide to refer to it at various key times during the competitive bid process (e.g., when first completing the "Service Work Order" before the work has been performed and when finishing it after the work has been completed) in order to check that all steps have been performed correctly.

1-3 Formulate a mental summary of the process described above.

3.1 ***Recall the key points*** remembered while reading.

3.1.1 Each step in the process (there are 8) might be remembered by a brief phrase. For example, "get forms from RPM" (step 1), "fill out SWO" (step 2), "date and sign SWO with contractor (step 3), and so forth. Some steps might be combined in one phrase to simplify the key points. (For example, steps 7 and 8 might be summarized as "make copies of important documents and send originals to accounting.")

3.2 ***Assemble the key points into a simple mental summary.***

3.2.1 ***Remember*** the steps of the process in a ***sequence.***

3.2.2 Knowledge of the purpose of the steps, not directly described on the form, might help one summarize them. (For example, knowing that the regional property manager must approve subcontracted work over $1000 might help one remember that he/she is supposed to receive a copy of the completed "Service Work Order" before the work is performed. Similarly, knowing that the "Service Work Order" serves as the subcontractor's bill within the company might help one remember that upon completion of the work it must be sent to the company accounting department.) [Note: The maintenance superintendent we interviewed about this task relied on this background knowledge to remind himself of the steps in the process.]

1-4 When conducting the competitive bid

4.1 ***Decide to consult the form*** if one is unsure about a step in the competitive bid

process, check the form to answer questions that arise.	process. 4.1.1 For example, if unsure about whether to send the contractor's billing statement to the accounting department, ***decide to consult*** the form. 4.2 ***Formulate a question*** to answer when consulting the form. 4.2.1 For example, "Should I send the contractor's billing statement to the accounting department?" 4.3 ***Scan*** the form to locate the section(s) that is (are) likely to answer the question. 4.3.2 For the question noted above, the sections most likely to contain the answer are steps 7 and 8. 4.4 ***Carefully read the chosen sections,*** searching for the answer to the question and, if necessary, ***synthesize information*** to answer the question. 4.4.1 For the sample question noted above the answer ("no") can be inferred from information synthesized from both of the chosen passages. 4.5 If the passage answers the question, finish; if not, ***continue to search*** for the answer by identifying other passages to read.
I-5 After completing a step in the process, note progress on the form.	5.1 ***Scan*** the form to locate the step just completed. 5.1.1 ***Scan*** the column containing the responsibilities of the maintenance superintendent. 5.1.2 ***Look for key words*** or phrases to help locate the correct step. For example, if the step just completed is that the subcontractor has finished the work and signed the "Service Work Order," then key words or phrases might be: "completed work;"

"contractor;" and "signs."

5.2 ***Read*** the step to be sure it is the correct one.

5.2.1 Carefully ***read*** the step to be sure it describes the correct step.

5.2.2 If unsure, continue to ***scan*** for other possible steps and read those.

5.2.3 ***Compare the descriptions*** of the steps to determine which is the correct one.

5.3 ***Check off*** the step to indicate that it has been completed.

5.3.1 ***Locate*** the last row in which the step is described (the description of a step often takes up several rows.)

5.3.2 ***Scan*** across the row to locate the blank line in the "Completed" column.

5.3.3 ***Place a check*** on the blank line.

5.4 ***Record the date*** on which the step was completed.

5.4.1 ***Locate*** the last row in which the step is described (the description of a step often takes up several rows.)

5.4.2 ***Scan*** across the row to locate the blank line in the "Date" column.

5.4.3 ***Place a check*** on the blank line.

[Note: There are a number of characteristics of the "Maintenance Superintendent's Checklist for Service Work Orders Over $1000" that make it difficult to use, particularly for a relatively inexperienced worker. First, there are no directions provided explaining the structure of the form or indicating exactly how it should be used. Second, the steps involved in requesting bids and evaluating them are not described in any detail. Only the steps involved in completing the "Service Work Order" form are systematically described. Third, there are several errors on the form that make it less clear than in should be. A spelling and a tense error affect comprehension very little. However, step 6 seems to contain a major error. Contrary to the instructions on the "Service Work Order," it does not state that the maintenance superintendent should sign the form if the work has been completed satisfactorily. The statement "PMS inspects work and signs SWO if work is not satisfactory" probably should not contain the word "not."]

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

10. APPLYING CHECKLIST FOR "SERVICE WORK ORDERS" FOR SUBCONTRACTED REPAIRS AND MAINTENANCE WORK WHEN COSTS EXCEED CERTAIN DESIGNATED AMOUNTS

  a. FILLING OUT SPECIFICATIONS FOR SUCH WORK ORDERS

Competitive Bid Process –

Reading and Filling out Specifications for Subcontracted Repairs and Maintenance.

Overall task description:

A maintenance worker might have to read and fill out specifications for repair and maintenance tasks for a variety of reasons. First, s/he might read specifications to get a general sense of what kind of services and materials must be purchased to complete a repair/maintenance task. Second, if the cost of a subcontracted repair/maintenance task exceeds a certain amount ($1000. ???), the maintenance superintendent must solicit bids from competing subcontractors, using a "Request for Quotation" form. To complete this form, she/he often must use specifications provided by the apartment management company for the particular work to be subcontracted. Third, a maintenance superintendent might refer to specifications to evaluate competing bids submitted for a task to be subcontracted. Fourth, a maintenance superintendent might refer to specifications for a particular task to be subcontracted when planning her/his annual budget request.

Frequency performed: The maintenance superintendent interviewed about this task indicated that he uses specifications for all "planned majors" (major, routine repair/maintenance tasks subcontracted to service providers). He indicated that he refers to specifications for several different tasks each year. However, he might use the same set of specifications several times in the process of budgeting, requesting bids, and evaluating bids for a particular task.

	Type of Material/Task
Prose	✓ (descriptions of specifications for subtasks)
Document	✓ (outlines of specifications, forms describing characteristics of acceptable work materials, charts)
Quantitative	✓ (measurements to be performed, calculated, and recorded)

Misc.:

- very important task
- task is performed at all sites
- task is performed by maintenance superintendents and rental managers (very rarely, if at all, by maintenance assistants)

Reading and Filling out Specifications for Subcontracted Repairs and Maintenance.

Maintenance superintendents (and rental managers) have access to a notebook provided by the apartment management company describing specifications for various routine repair and maintenance tasks that are regularly subcontracted to service providers. The sets of specifications are organized according to the type of work to be performed. For example, the specifications we examined in analyzing this task were titled "Specifications for asphalt seal and stripe." A table of contents provides a title for each set of specifications provided and the page number on which each set of specifications begins.

The set of specifications examined in our analysis of this task, "Specifications for asphalt seal and stripe," include several different kinds of documentation. First, a detailed outline describing the steps entailed in and specifications for each subtask is provided. Some of the information in the outline is written in prose paragraphs. Second, there are several places where the person preparing a request for quotation (the maintenance superintendent and/or rental manager) must fill out specific information describing the work to be subcontracted. For example, the total area to be seal coated, the number of parking stripes to be painted, and the color of the parking stripes must be indicated.

Third, these specifications also include detailed descriptions of the characteristics and instructions for using materials acceptable for use in completing the subcontracted work. For example, specific brands of seal coating and crack filler and sealer are described. (The specifications note that these particular materials or their equivalents may be used.) Finally, the specifications include a worksheet to be used for listing the places to be sealed and painted, calculating the area of each place, and describing the type of repair necessary.

The specifications are written in a formal, contractual style. For the most part, the anticipated audience is service providers submitting bids or subcontracted to perform requested repairs/maintenance.

The task of reading and filling out specifications for subcontracted repairs and maintenance is analyzed in the context of a maintenance superintendent preparing to submit a "Request for Quotation" to competing service providers.

Steps of Sub-Task	**Related Literacy Elements in Steps**
I-1 Locate the appropriate set of specifications in notebook.	1.1 Based on the task to be performed, mentally ***formulate a list*** of key words likely to appear in the title for the relevant set of specifications.

1.1.1 For example, if a maintenance worker wants to locate the specifications for repairing and maintaining the surface of driveways and parking lots, she/he might ***mentally note*** to look for such words as "driveway and parking surface repairs," "asphalt coating or sealing," and "parking stripe repainting."

1.1.2 Workers with relatively more experience on the job and/or greater familiarity with the specifications notebook are more likely to identify a close approximation to the title of the relevant set of specifications.

1.2 Either by using the table of contents or by thumbing through the notebook, ***locate*** the appropriate set of specifications.

1.2.1 ***Match*** the mentally listed key words to the titles in the table of contents to locate the likely appropriate set of specifications. For example, the appropriate set of specifications for the key words noted above is titled "Specifications for asphalt seal and stripe."

1.2.2 ***Scan*** the listing in the table of contents to ***find*** the page number on which the specifications begin and turn to the correct page, ***matching the number*** in the listing to the numbers on the pages.

1.2.3 Or, flip through the sets of specifications in the notebook, ***scanning*** headings or entire pages, looking for key words to locate the appropriate section. For example, the set of specifications titled "Specifications for asphalt seal and stripe" are labeled as such on the first page of the section; subsequent pages in the section are labeled "Seal and stripe."

1.2.4 ***Skim*** the set of specifications to be sure that it is the appropriate one for the work to be subcontracted.

I-2 Scan the specifications and determine which parts require closer reading and other additional information.

2.1 ***Form mental questions*** about the work task and ***scan*** for passages containing the answers to these questions. For example, the superintendent we interviewed asked such questions as, "Will asphalt surfaces with cracks and holes need to be replaced or can they be repaired?" "What do I need to do to complete these specifications?" "What do I need to do to prepare the parking areas for asphalt coating?"

2.1.1 ***Determine*** which parts of the specifications are relevant only to service providers and ignore these parts. For example, the superintendent we interviewed decided that the descriptions of acceptable materials for use in crack filling and asphalt sealing were not relevant to him although they were relevant for bidders.

2.1.2 ***Identify passages to read more closely*** based on whether they seem to answer questions (described above). For example, based on the above questions, the superintendent decided he would need to read the first few pages of the specifications. He might have decided he would need to pay special attention to the passages describing the preparation of parking areas and the drying time of fillers and sealers in order to communicate with residents about inconveniences they would experience while the subcontracted work is being performed.

2.2 ***Scan*** the specifications for any areas to be filled out before the specifications are turned over to service providers for bids.

  2.2.1 In particular, ***locate*** any blanks to be filled in. For example, the specifications for asphalt sealing and striping have blanks for the following information: approximate total square yards to be sealed; total number of parking stripes to be repainted; and, the color of the parking stripes (a choice of white and yellow is offered.)

  2.2.2 Also, ***locate*** any worksheets to be completed. For example, the asphalt sealing and striping specifications include a worksheet for noting the locations needing work, calculating the area of each location, and indicating the type of repair necessary for each location.

2.3 For each of the steps described above, the worker might ***consult another source for help***. For example, the superintendent interviewed indicated that he looked at a "Request for Quotation" filled out the last time the complex had asphalt sealing work done and that he asked the rental manager for assistance.

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I-3 Closely read relevant sections of specifications and gather necessary information.

3.1 ***Closely read*** identified passages of the specifications with the purpose of answering questions (described above).

3.1.1 After reading identified passages, decide whether questions have been answered satisfactorily. If they have been answered, go on. If not,

3.1.2 ***Search the specifications*** again, looking for sections likely to answer the questions. ***Read*** those passages. Continue this process until questions have been answered satisfactorily or it seems the answers are not contained in the specifications.

3.1.3 ***Synthesize the information*** from various passages to ***formulate*** coherent ***answers to the questions***. For example, information has to be synthesized from various places in the asphalt sealing and striping specifications in order to determine what kind of information will need to be communicated to tenants about where to park and how long they will have to give up their parking spaces while parking areas are sealed and painted.

3.2 ***Determine*** what tasks need to be done in order to be able to fill in the blanks and worksheets.

3.2.1 For example, in order to complete the worksheet and to fill in the blanks in the asphalt sealing and striping specifications, the superintendent had to determine: which areas needed what kind of treatment; the dimensions of each area to be worked on; the number of parking stripes to be painted; and the color of the parking stripes.

3.3 Perform the tasks necessary to gather the information required to be added to the specifications.

3.3.1 For example, the superintendent decided to rent a measuring wheel to measure the dimensions of each area to be sealed. He ***measured the areas*** as a series of rectangles (i.e., he treated irregularly shaped areas as if they were rectangles and treated L-shaped parking areas as two rectangles). He ***noted*** the dimensions of each area on a note pad as he made the measurements.

3.3.2 To determine information about parking stripes, the superintendent we interviewed looked at the color of the old stripes. Also, he ***counted*** the existing stripes in the parking areas (and ***added*** the number of stripes in each area to arrive at a total) to note how many stripes needed to be painted. If this exact task had been completed before, he might have checked the "Request for Quotation" on file for the task to find this information.

I-4 Fill in information missing in the specifications.

4.1 After gathering the required information, perform any necessary ***mathematical calculations***.

4.1.1 For example, to complete the blank and the areas of the worksheet requesting the square yardage of the areas to be sealed, the supervisor needed to ***calculate the areas of rectangles***. He knew the formula for the calculation ***(apply formula)***; if he didn't he could've gotten help from another worker, probably the rental office manager, or could've used the worksheet to help. The worksheet doesn't provide a clear explanation of how to calculate areas but it does hint that multiplication is involved. (Under the column "Measurement/Total" is written "______ X ______ = ______") Since he recorded the measurements of each rectangle in feet, he multiplied the width by the length to get the total square feet of the area. Then, he divided by nine to convert square feet to square yards. Next, he summed all of the areas measured to arrive at the "approximate total square yards" to be sealed ***(follow sequential procedure).***

4.2 ***Scan*** the specifications to find the blanks that need to be filled in. ***Locate*** the necessary information in notes and ***transfer*** it to (type it on) the specifications (e.g., approximate total square yards to be sealed, total number of parking stripes to be painted, and the color of the parking stripes).

4.3 ***Fill in*** the information required on any worksheets and complete the worksheet.

4.3.1 For example, the worksheet in the asphalt sealing and striping specifications is set up for the worker filling out the worksheet to: ***describe*** each location needing work; ***calculate the dimensions and area*** of each location; ***describe*** the type of repair necessary in each location; and, ***total*** the areas of all the locations.

4.3.2 To figure out how to complete this worksheet, the worker must be familiar with a table format ***(read tables)***, must ***interpret*** the labels on columns and rows, and must ***transfer information*** to the appropriate spaces (row and column). *[Note: the filled in example of the worksheet for the asphalt sealing and striping specifications that we examined is not filled in completely. It seems that the information provided is intentionally abbreviated. For example, in the column where one is expected to list each of the locations requiring work, the following information is typed (ignoring the row numbers): "All drives and parking spaces except for main drive between 10th street and Pete Ellis drive." A separate entry in this column reads "parking stripes." Also, only the total approximate area requiring sealing is noted; no dimensions or areas are provided for specific parking lots or driveways.]*

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

10. APPLYING CHECKLIST FOR "SERVICE WORK ORDERS" FOR SUBCONTRACTED REPAIRS AND MAINTENANCE WORK WHEN COSTS EXCEED CERTAIN DESIGNATED AMOUNTS

  b. FILLING OUT "REQUEST FOR QUOTATION" ON SUCH ORDERS

Competitive BID Process –

Filling Out "Request for Quotation" Form for Subcontracted Repairs and Maintenance.

Overall task description:

According to the apartment management company, maintenance superintendents must solicit bids on all subcontracted repair and maintenance work exceeding $1000. (???) For "planned majors" (major, routine repair/maintenance tasks subcontracted to service providers) the maintenance superintendent must complete a "Request for Quotation" form, attach specifications (see the literacy task analysis titled "Reading and filling out specifications for subcontracted repairs and maintenance"), and send the "Request for Quotation" to at least three chosen service providers. "Planned majors" include such repair/maintenance tasks as: resurfacing driveways and parking areas; exterior painting; roofing; and major pool repairs.

The process of evaluating bids submitted by service providers in response to the "Request for Quotation" is analyzed separately (see the literacy task analysis titled "Evaluating bids for subcontracted repairs and maintenance").

Frequency performed: The maintenance superintendent interviewed about this task indicated that he completes "Request for Quotation" forms for several "planned majors" each year. The frequency of this task will vary from site to site (and year to year at a given site) depending on the number of major repair/maintenance tasks to be subcontracted.

	Type of Material/Task
Prose	✓ (outline of "special notes")
Document	✓ (form)
Quantitative	

Misc.:

- very important task (large sums of money involved)
- task is performed at all sites
- task is performed by maintenance superintendents and rental managers (very rarely, if at all, by maintenance assistants)

Filling Out "Request for Quotation" Form for Subcontracted Repairs and Maintenance.

The "Request for Quotation" form consists of five pages separated by carbons. The top four sheets are designed to be addressed to different service providers and are labeled "This copy to be returned." All information typed on the top four sheets by the maintenance superintendent transfers to the bottom sheet, which is designated to be "Retained by person requesting quote." (All information transfers to the top four sheets except the names and addresses of the other service providers solicited for bids.)

The form is designed so that the maintenance superintendent initially fills out basic information about the apartment complex requesting the bid and a brief description of the repair/maintenance work to be performed. In the case of the "Request for Quotation" that we analyzed (for asphalt sealing and striping) the superintendent attached a page of "special notes" (also analyzed below) and specifications for the work (see the literacy task analysis titled "Reading and filling out specifications for subcontracted repairs and maintenance").

The service provider completes the form, including unit and total prices for the work to be performed. In the case of the "Request for Quotation" that we analyzed the service providers also were required to submit with their bid a copy of their insurance liability and Workman's Comp, and three work-related references.

Steps of Sub-Task	Related Literacy Elements in Steps
I-1 Fill out basic information requested at the top of the form.	1.1 ***Scan*** the form to locate areas for providing basic information about the complex and maintenance superintendent requesting the bids, and relevant dates. 1.2 ***Fill in*** the requested information. 1.2.1 ***Locate*** the area labeled "From" and in it provide the name and address of the apartment complex. *(Note: There are no clarifying remarks to indicate specifically what information to provide in this area, although the layout of the space suggests an address is required. Previous personal experience, another experienced employee (e.g., the rental manager), or an example of a previously filled out "Request for Quotation" must be relied upon for*

determining exactly what information to provide. Thus, a new worker might encounter difficulty completing this section of the form, as well as other sections discussed below.]

1.2.2 ***Locate*** the area labeled "Attn" and in it ***write*** one's own name (the name of the maintenance superintendent).

1.2.3 ***Locate*** the area labeled "Date" and ***fill in*** today's date (the date on which the form is completed to be sent to bidders).

1.2.4 ***Locate*** the area labeled "Return quote by" and ***indicate*** when bids should be submitted for consideration. A date might be provided or, as in the case of the form we analyzed, "ASAP" (as soon as possible) might be indicated.

1.2.5 If the "Request for Quotation" is to be sent to more than four bidders (the example we analyzed was sent to five bidders), a second (and identical) "Request for Quotation" must be prepared and the preprinted form number (printed on the upper right corner) must be replaced with the number printed on the first form to indicate that these sheets are all part of the same "Request for Quotation." *[Note: There also is an area labeled "Deliver by:" on the top of the form. The superintendent we interviewed was not sure what information might be requested here and left the area blank. Most likely this space is relevant when the "Request for Quotation" is used to obtain quotations for products, such as appliances, rather than for services;*

the superintendent probably is expected to note the date when the product would need to be delivered.]

I-2 Summarize the description of the work to be subcontracted from information in the specifications, including the worksheet.

2.1 ***Read and fill out*** the specifications for the work to be subcontracted. *[Note: See the literacy task analysis titled "Reading and filling out specifications for subcontracted repairs and maintenance."]*

2.2 ***Scan*** the completed specifications ***for vital information*** to be summarized on the "Request for Quotation."

2.2.1 ***Search*** for basic information about the nature of the work to be performed. For example, the "Request for Quotation" we analyzed indicated the following subtasks to be performed: repair cracks and holes; seal coat drives; and, restripe parking lines.

2.2.2 ***Locate information*** previously filled in on the specifications about the extent of the work to be performed. For example, the sample completed specifications for asphalt sealing and striping work include information scattered throughout the specification pages about the dimensions and area of the surfaces to be repaired and sealed and the number of parking stripes to be repainted.

2.3 ***Synthesize information*** gathered from various parts of the specifications.

2.3.1 ***Combine*** the vital ***information into*** a coherent mental ***description*** of the work to be performed.

2.3.2 ***Sort out information*** to be summarized from information to be referred to (by such phrases as "as specified," "as per attached worksheet," and "according to attached specifications") in the description column on the "Request for Quotation."

2.4 ***Scan*** the "Request for Quotation" to ***locate*** the column in the table labeled "Description" ***(locate information in table)*** and in this space ***write a summary description*** of the work to be performed.

2.4.1 ***Outline*** each of the subtasks to be subcontracted on separate lines so the service provider can provide prices in the "Amount" column for each of the subtasks to be subcontracted. For the example we analyzed subtasks described on separate lines are: "Repair cracks and holes as specified;" "Seal coat drives as per attached worksheet;" "Restripe 249 lines in parking areas."

2.4.2 Also, on the sample completed form we analyzed, a separate line states, "All work to be done according to attached specifications."

1-3 Write any "Special instructions" and "Remarks," and fill in the "Specifications attached?" box.

3.1 In the "Special instructions" box ***clarify*** and stress to the service providers any information they might need to interpret the description of the work to be performed.

3.1.1 For example, on the completed "Request for Quotation" that we analyzed the superintendent wrote the following statements in this box: "Vendor responsible for measurement of areas to be Sealcoated." Although an estimate of total area to be sealed is provided by the superintendent in two places in the specifications, it is not provided in the table on the "Request for Quotation" form. This comment might indicate to service providers that they should measure the areas to be sealed themselves before submitting their bids.

3.2 In the "Remarks" box ***note*** any additional information regarding the procedure for submitting bids.

3.2.1 For example, on the completed "Request for Quotation" that we analyzed the superintendent noted: "Sign quote and spec sheet before returning." This statement reminds the bidders to sign the two areas provided for their signatures.

3.3 ***Fill in*** the "Specifications attached?" box.

3.3.1 ***Check*** "no" or "yes," indicating whether specifications are attached to the "Request for Quotation" form.

3.3.2 Also, there is a blank labeled "No." which might be for indicating an identification number for the set of specifications attached. The superintendent we interviewed for this analysis was not sure about what information to supply in this blank and did not fill it in on the completed "Request for Quotation" that we analyzed.

1-4 Compose the "special notes" to be attached to the "Request for Quotation."

4.1 ***Summarize in outline form*** any special requirements for acceptance of a bid.

4.1.1 ***Indicate*** (or emphasize) special terms of agreement that the service provider must accept if the work is awarded to him/her. In the sample completed "Request for Quotation" that we analyzed four of the six points included in the special notes refer to special terms with which the chosen subcontractor must comply (e.g., "All workmanship is to be guaranteed for one year").

4.1.2 ***Note*** any information that must accompany the service provider's bid in order for it to be considered. In the completed "Request for Quotation" that we analyzed two of the six points included in the special notes refer to additional information the bidder must supply (a copy of insurance liability and Workman's Comp, and three work-related references).

4.2 Provide an area in which the "contractor" (bidder) and "GGMC" (a representative, probably the regional property manager, of the Gene Glick Management Company) can sign and date the page indicating acceptance of the conditions specified in the "special notes."

4.2.1 In this area, ***fill in*** the apartment complex name in a blank labeled "Project Name."

I-5 Review, revise, and type the form and attachments.

5.1 ***Review and revise*** the draft specifications, "Request for Quotations" form, and "Special notes" attachment.

5.1.1 ***Check the completeness and accuracy*** of the information provided.

5.1.2 ***Check the wording*** of the information provided.
[Note: The maintenance superintendent we interviewed indicated that he needed considerable

help reviewing and revising the "Request for Quotation" and attachments. In particular, he needed help with the wording of statements on the "Request for Quotation" form and the "Special notes" attachment. He relied upon samples of forms previously completed (by another maintenance superintendent) and on the advice of the rental manager. Because these documents are treated as formal, contractual agreements, wording is particularly important. For example, the superintendent we interviewed indicated that he had changed the statement "Repair cracks and holes as needed" to "Repair cracks and holes as specified," based on the advice of the rental manager. Clearly, previous experience completing these forms, particularly if it is guided by a knowledgeable employee (e.g., another maintenance superintendent, a rental manager, or a regional property manager), makes this task much easier.]

5.2 ***Type*** the "Request for Quotation" form and attachments. The maintenance superintendent we interviewed typed the documents himself. In fact, he noted that he would like assistance to improve his typing skills. Perhaps at other sites someone in the rental office types these documents for the superintendent.

I-6 Identify and type on the form the names and addresses of the subcontractors to receive the "Request for Quotation."

6.1 ***Identify*** service providers from whom to solicit bids (send the "Request for Quotation").

6.1.2 The superintendent we interviewed indicated that he relies primarily on his own and other Glick superintendents' experience when identifying bidders for a repair/maintenance task. However, he also mentioned the district property manager, other apartment superintendents in the community, the Yellow Pages, and promotional materials received from subcontractors as sources for identifying service providers to bid on a task.

6.2 ***Locate and type*** on the "Request for Quotation" the names and addresses of the service providers from whom bids are to be solicited.

6.2.1 ***Locate*** the service providers' names and addresses on an old "Request for Quotation" or "Service Work Order," in the Rolodex, in the phone book, or in promotional materials.

6.2.2 ***Scan*** the "Request for Quotation," ***locate*** the spaces for the bidders' names and addresses (labeled "To:"), and ***type*** each bidder's name and address in a separate space (on a separate sheet of the form).

APPENDIX E

Analysis of Job Materials for Maintenance Workers and Supervisors

Job Task Surveyed

10. APPLYING CHECKLIST FOR "SERVICE WORK ORDERS"
FOR SUBCONTRACTED REPAIRS AND MAINTENANCE WORK
WHEN COSTS EXCEED CERTAIN DESIGNATED AMOUNTS

c. EVAULATING BIDS FOR SUBCONTRACTED REPAIRS AND MAINTENANCE

Competitive Bid Process –

Evaluating Bids for Subcontracted Repairs and Maintenance.

Overall task description:

For all subcontracted maintenance and repair work costing over $1000. (???), the maintenance superintendent is required (by apartment management company policy) to solicit bids from at least three service providers. See the literacy task analysis titled "Filling out 'Request for Quotation' form for subcontracted repairs and maintenance" for a description of this process.

After service providers receive the "Request for Quotation" form and the accompanying specifications and other attachments, they prepare a bid on the work to be subcontracted. Depending on the nature of the work, they might visit the apartment complex to determine the extent of the work in order to prepare their bids. For example, in the case of the asphalt sealing and striping task that we analyzed a service provider bidding on the work might have wanted to visit the site to determine how extensive the asphalt repairs would be and to measure the areas to be sealed.

Next, the bidders fill out the "Request for Quotation" form (indicating the amount they would charge to complete the designated work) to the maintenance superintendent along with any additional information requested.

The maintenance superintendent is responsible for evaluating the bids submitted and making a recommendation to the regional property manager as to which service provider should be awarded the work. This process is described below. The regional property manager appears to make the final decision, based on the maintenance superintendent's recommendations.

Frequency performed: The maintenance superintendent interviewed about this task indicated that he evaluates bids for "planned majors" (major, routine repair/maintenance tasks subcontracted to service providers) several times each year. The frequency of this task will vary from site to site (and year to year at a given site) depending on the number of major repair/maintenance tasks to be subcontracted.

	Type of Material/Task
Prose	
Document	✓ (form)
Quantitative	✓ (comparing bids to each other and to budgeted expenditures)

Misc.:
- very important task (large sums of money involved)
- task is performed at all sites
- task is performed by maintenance superintendents and rental managers (very rarely, if at all, by maintenance assistants)

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Evaluating Bids for Subcontracted Repairs and Maintenance.

The maintenance superintendent evaluates bids primarily based on the information provided by the bidders on the returned "Request for Quotation" forms. The general format of the "Request for Quotation" and the process by which the superintendent initially fills out this form are described in the literacy task analysis titled "Filling out 'Request for Quotation' form for subcontracted repairs and maintenance."

The bidders are responsible for completing the table on the "Request for Quotation." For each subtask listed in the "Description" column, they provide a "Unit price" (if relevant) and a total price for the subtask (in the "Amount" column). At the bottom of the table they indicate the total price for all work to be subcontracted (in a box labeled "total"). Also, the bidder fills out the following boxes: "quotation date;" "terms;" "F.O.B.;" "shipping point;" "approx. ship date;" and, "vendor's signature." (The boxes labeled "F.O.B.;" "shipping point;" and "approx. ship date" are relevant only if the "Request for Quotation" is for products, such as appliances or a tractor, rather than services. Thus, they are not applicable for the specific task we analyzed (asphalt sealing and striping).

In the case of the completed "Request for Quotation" that we analyzed, the bidders also were required to sign and date an attachment labeled "Special notes." In addition, they had to provide with their bid a copy of their insurance liability and Workman's Comp, and three work-related references.

The maintenance superintendent (and later the regional property manager) use these documents, as well as information gathered about the bidder from other sources (described below), to evaluate the bids and award the contract for the work.

Steps of Sub-Task	Related Literacy Elements in Steps
II-1 Check bid packages to be sure they are complete.	1.1 ***Formulate a mental check*** list of all items each bidder must submit in order for her/his bid to be considered. 1.1.1 ***Search*** the "Request for Quotation" form and the "Special notes" attachment to ***determine*** what items are required from bidders. For example, in the completed sample that we analyzed each bidder is required to sign and date the documents in two places, and to provide a copy of her/his insurance

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liability and Workman's Comp, and two work-related references.

- 1.1.2 ***Form a mental check list*** composed of these items.

1.2 Relying upon this mental check list, ***scan*** each bid package to be sure it is complete.

- 1.2.1 ***Scan*** the "Request for Quotation" form and the "Special notes" attachment for the bidder's signature and date.
- 1.2.2 ***Scan*** the bidder's attachments, searching for key words, to ***determine*** whether a copy of the bidder's insurance liability, Workman's Comp, and three work-related references are provided.
- 1.2.3 Repeat the above two steps until each bid package has been examined. Set aside any incomplete bid packages.

1.3 ***Determine*** what to do with incomplete bid packages.

- 1.3.1 Do not consider any incomplete bid packages when determining to whom to award the contract. Or,
- 1.3.2 If time allows or if a particularly desirable bidder has submitted an incomplete bid package, contact the bidders' whose packages are incomplete and request the missing items.

II-2 Compare and evaluate prices submitted in bids.

2.1 ***Scan*** each bid to ***locate*** the prices submitted by each bidder.

- 2.1.1 ***Scan*** the table on the front of the "Request for Quotation" to locate the bidder's total bid on the work to be subcontracted; ***locate*** the box labeled "Total."
- 2.1.2 Repeat this step for each of the bid packages.

2.2 ***Compare*** the bidders' total bids for the work to be subcontracted.

  2.2.1 ***Determine*** the ordering of the bids from highest to lowest. *[Note: In the case of the completed "Request for Quotation" that we analyzed five bids were requested and presumably submitted.]*

  2.2.2 If a bid is substantially higher than the other bids submitted, eliminate it from consideration. *[Note: This decision seems to be highly subjective. The superintendent we interviewed could not articulate a strict criterion for making this determination.]*

  2.2.3 If a bid is substantially lower than the other bids (again, based on a subjective criterion), set it aside for closer examination.

2.3 Closely ***examine*** any inordinately low bids.

  2.3.1 ***Formulate a series of questions*** to answer about any bids that are substantially lower than the other bids. Questions to answer might include the following: Which subtask(s) has this bidder quoted at substantially different rates from those of the other bidders? Has the bidder left out prices for any of the subtasks? Is there a risk that this bidder might do substandard work? Am I (or do I know someone who is) familiar with this bidder's work?

  2.3.2 ***Scan*** the "Amount" column on the "Request for Quotation" of any inordinately low bids; compare to the amounts quoted on the other bids. Answer as many of the questions formulated in the previous step as possible. Look for which subtask(s) is (are) quoted substantially lower than those of other bidders. ***Check*** that all subtasks are included in the quote.

2.3.3 If subtasks have been left out of the bid or if personal previous experience with the bidder leads to the suspicion that she/he will do substandard work, eliminate the bid from competition ***(make judgments based on previous experience).***

2.3.4 If unsure about the legitimacy of the bid, keep it in competition and resolve to ***gather more information*** about the bidder.

II-3 If necessary, reevaluate plans for subcontracted work.

3.1 ***Compare*** the amounts of the medium-range bids with the budgeted amounts for the work to be subcontracted.

3.1.1 If the amounts of the medium-range bids are roughly comparable to the amount budgeted for the work, go on to consider the bids more closely. *[Note: Again, the maintenance superintendent must make a subjective judgment. For all of these subjective judgments, workers with previous experience with the competitive bidding process find them easier to make. Workers with little or no experience probably rely on other employees (e.g., other maintenance superintendents, the rental manager, the regional property manager) to assist them.]*

3.1.2 If the amounts of the medium-range bids greatly exceed the amount budgeted for the work, ***decide*** to request additional bids or reconsider the extent of the work to be subcontracted. *[Note: The superintendent we interviewed could not articulate a hard and fast rule for making this decision. He stated that the decision must be made on a case by case basis. Partly, it depends on the state of the complex's budget at the time, the importance of the work to be subcontracted, the availability of additional bidders (other than those originally solicited), and the extent to which the work might be scaled down from the original plans.]*

3.2 If necessary, request additional bids on the work to be subcontracted or reconsider the extent of the work.

3.2.1 If there are additional, acceptable service providers who were not requested to submit bids, request bids from them and begin the decision-making process again after the additional bids have been received.

3.2.2 If there are no other satisfactory service providers available (and it is not possible to exceed the budget), defer or scale down the work to be subcontracted. [For example, in the case of the asphalt sealing and striping task that we analyzed, the maintenance superintendent decided that he would have to revise his original plans because he could not afford to complete all of the work it included. He decided to seal and stripe only those driveways and parking lots most in need of work and to delay work on the other areas included in the original plan.]

3.3 If a decision has been made to scale down the work, either request new written bids or contact the bidders to confirm a price on the scaled down work.

3.3.1 Request new written bids if the nature of the scaled down work is substantially different from the nature of the work originally planned. For example, if a decision is made to patch asphalt rather than replacing it, a new "Request for Quotation" probably would have to be initiated.

3.3.2 If the nature of the scaled down work is essentially the same, ***calculate an estimate*** of each bidder's price for the scaled down work. Assume that unit prices will remain roughly the same. *[Note: The maintenance superintendent we interviewed was aware that the bidders' loss of some economies of scale might raise the unit prices for the scaled down work.]* ***Estimate what percentage*** the scaled down work is of the originally planned work. ***Figure the corresponding percentage*** of the original total bid. For example, in the case we analyzed the maintenance superintendent decided to have performed the exact same type of work but on a smaller area than originally planned. Thus, he ***estimated*** the new area to be sealed and ***determined*** that it was 60% of the original estimated area. Next, he ***multiplied*** each of the original quotes for sealing ***by .6*** on his calculator to arrive at an estimated price for the scaled down sealing task. He performed a similar computation for the cost of the reduced number of parking stripes. For each bidder he ***added*** the sealing and striping subtotals to arrive at a new grand total. ***[Note: This process requires an understanding of how to calculate percentages and to use a calculator, and it entails division, multiplication, and addition.]***

3.3.3 ***Verbally confirm*** the new estimated bids with the bidders if the nature of the scaled down work is essentially the same.

II-4 Gather and assess additional information about bidders.

4.1 ***Recall*** any personal previous experience, both positive and negative, with any of the bidders.

4.1.1 ***Formulate a mental checklist*** of considerations when evaluating previous personal experience with any bidders (as well as information gathered from other sources). For example, this checklist might include such issues as: "Did this bidder complete the work on time?" "What was the quality of the previous work?" "Did I get long with the personnel and would I like to work with them again?"

4.1.2 ***Evaluate*** each bidder with whom one has had past experience according to the criteria generated in the previous step.

4.2 Contact familiar sources for additional information about the bidders with whom one has not had previous experience.

4.2.1 If possible, ***discuss*** the qualifications of each of the bidders with personnel within the apartment management company. For example, the maintenance superintendent whom we interviewed mentioned that he often discussed competing bidders with other maintenance superintendents, the rental manager, and the regional property manager.

4.2.2 If contacts within the apartment management company are not familiar with the bidders, ***discuss*** the bidders with other maintenance superintendents (employed by other management companies) in the local community who are familiar with the bidders.

4.3 If contacts (within and outside the apartment management company) are not familiar with the bidders or provide insufficient information, ***call a couple of references*** for each bidder.

4.3.1 In conversations with bidders' references, ***seek answers*** to the questions described above and ***weigh the usefulness of the information*** in light of the fact that references always are likely to be positive.

4.4 Eliminate from consideration any bidders who don't meet the minimum criteria (e.g., getting work done on time, performing high quality work, being personableness).

II-5 Based on all the available information, choose a subcontractor

5.1 ***Reconsider*** the bids still in competition.

5.1.1 ***Reexamine*** the amount of the bids submitted by the remaining competitors.

for the work.

5.1.2 ***Evaluate*** the importance of the differences in the amounts bid, taking into account the information gathered about each bidder.

5.2 ***Choose*** a bidder to whom to award the contract (to recommend to the regional property manager) according to the following considerations.

5.1.1 If the bids are roughly similar, but there are other reasons to prefer a particular bidder (based on the considerations discussed above), choose the preferred bidder even if the bid is slightly higher than the others.

5.1.2 If the bids are roughly similar and there is no strong reason to prefer one bidder over another, choose the lowest bidder.

5.1.3 If the bids are substantially different and there is no strong reason to prefer one bidder over another, choose the lowest bidder.

5.1.4 If the bids are substantially different and there are strong reasons to prefer a relatively high bidder over a relatively low bidder, weigh the financial cost of choosing the preferred, higher bidder against the other gains (in efficiency, quality of work, personable). [Note: This decision is an extremely subjective one. If the maintenance superintendent chooses a substantially higher bidder over lower bids, she/he has to be prepared to defend the choice to the regional property manager who must approve it and may overrule it.] ***[Note: Tasks in section 5.2***

require the worker to apply sophisticated decision-making and judgment skills in determining the best choice of a contractor.]

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GBGM 133

GENE GLICK MANAGEMENT

No. 10538

REQUEST FOR QUOTATION
NOT AN ORDER

FROM:

ATTN:

DATE:

DELIVER BY:

RETURN QUOTE BY:

QUOTE TO BE FIRM FOR 60 DAYS

SPECIAL INSTRUCTIONS:	SPECIFICATIONS ATTACHED? ( ) NO ( ) YES No. ______

QUANTITY	DESCRIPTION	UNIT PRICE	AMOUNT
REMARKS:		TOTAL	

TO:

QUOTATION DATE	TERMS
F.O.B.	SHIPPING POINT
APPROX. SHIP DATE	VENDOR'S SIGNATURE

THIS COPY TO BE RETURNED

QUOTATION DATE	TERMS
F.O.B.	SHIPPING POINT
APPROX. SHIP DATE	VENDOR'S SIGNATURE

THIS COPY TO BE RETURNED

QUOTATION DATE	TERMS
F.O.B.	SHIPPING POINT
APPROX. SHIP DATE	VENDOR'S SIGNATURE

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QUOTATION DATE	TERMS
F.O.B.	SHIPPING POINT
APPROX. SHIP DATE	VENDOR'S SIGNATURE

THIS COPY TO BE RETURNED

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GENE GLICK MANAGEMENT

No. 10328

REQUEST FOR QUOTATION
NOT AN ORDER

FROM: Woodbridge Apts. 1
3401 John Hinkle Place
Bloomington, IN 47401

ATTN: Tom Mobley

QUOTE TO BE FIRM FOR 60 DAYS

DATE: March 3, 1989

DELIVER BY:

RETURN QUOTE BY: ASAP

SPECIAL INSTRUCTIONS: Vendor responsible for measurement of areas to be Sealcoated.

SPECIFICATIONS ATTACHED? ( ) NO [✓ (X) YES] No. ______

QUANTITY	DESCRIPTION	UNIT PRICE	AMOUNT
	Repair cracks and holes as specified Seal coat drives as per attached worksheet Restripe 249 lines in parking areas All work to be done according to attached specifications.		
REMARKS:	Sign quote and spec sheet before returning.	TOTAL	

TO:
JB Crider
4627 E. Morningside Dr.
Bloomington, IN 47401

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RETAINED BY PERSON REQUESTING QUOTE

GENE GLICK MANAGEMENT

No. 10528

REQUEST FOR QUOTATION
NOT AN ORDER

FROM: Woodbridge of Bloomington I
3401 John Hinkle Place
Bloomington, IN 47401

ATTN: Tom Mobley

DATE: Jan. 20, 1989

DELIVER BY:

RETURN QUOTE BY: Feb 10,1989

QUOTE TO BE FIRM FOR 60 DAYS

SPECIAL INSTRUCTIONS: Vendor responsible for own measurement of areas to be seal coated.

SPECIFICATIONS ATTACHED? ☐ NO ☒ YES No. ______

QUANTITY	DESCRIPTION	UNIT PRICE	AMOUNT
	Repair any cracks or holes as specified		
	Seal Coat drives as per attached worksheet		
	Restripe 249 lines in parking areas		
	All work to be done according to attached specifications.		
	REMARKS: Sign quotation and spec. sheets before returning.	TOTAL	

TO: Fleetwood Asphalt Co.
PO Box 602
Seymour, IN 47274

Reece Sealcoat
432 Center Street
Columbus, IN 47201

Lantz Asphalt Sealing Co.
3440 Leonard Springs Rd.
Bloomington, IN 47401

AAA Asphalt
6187 Icon Rd.
Bloomington, IN 47401

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SPECIFICATIONS FOR ASPHALT SEAL AND STRIPE

1. Scope: The scope of this project is to include all labor, materials, equipment and services necessary to seal all driveways, roadways and parking lots as specified.

   Approximate total square yards: 12444 .

2. Surface Preparation:

   a. All vegetation shall be removed from all surfaces to be sealed.

   b. All surfaces to be sealed shall be thoroughly cleaned to remove all foreign debris.

   c. Mud areas shall be scraped, broomed and washed with a high pressure washer when necessary.

   d. All areas of petroleum saturation shall be burned, scraped and coated with an acrylic oil spot primer.

3. Minor Surface Repair - Cracks:

   a. Hairline cracks shall be filled with sealer during sealcoating operation.

   b. All cracks 1/8" or wider shall be routed out to insure the proper amount of crack filling material is used.

   c. Routed cracks shall be heated, dried and cleaned with a heat lance using approximately 50 PSI compressed air, 13 PSI propane gas mixed in a proper mixing valve and dispersed to the lance using a 25 foot H.P.S. hose to insure proper temperature at point of combustion. All cracks and joints must be cleaned and dried prior to application.

   d. Crack filler shall be a fast-drying polymer, modified, hot-applied elastomesic crack filler containing select oils, resins, polymers, plastisizers, subabilizers, modifiers, ultra violet inhibitors and acphalt cement for use on bituinous and portland cement surfaces.

4. Sealer Application:

   a. Apply two full coats Cosmicoat or Brewer Coat fortified coat tar emulsion pavement sealer. The rubber fortified sealer shall contain three to four pounds of clean, graded silica sand per gallon. The contents and coverage of this sealer/sand slurry mix shall be closely monitored to assure maximum cure film thickness. Rate of application shall be approximately

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.18 gallons per square yard or 5.5 square yards per gallon with a drying time of two to three hours between coats or longer, depending upon drying conditions.

aa. (alternate to 4a) Two coats of Jeannite J-16" shall be applied over all parking stalls. The new pavement shall be allowed to cure for a minimum of 30 days prior to sealing. The pavement shall be cleaned as necessary and application of sealer shall be in accordance with the manufacturer's recommendations.

b. The sealer/sand emulsion shall be homogenous. Equipment used to apply sealer/sand emulsion shall have adequate agitation to keep materials thoroughly mixed and in proper suspension at all times during application.

c. The sealer/sand mix shall be uniformly applied utilizing techniques to fill voids and hairline cracks. There shall be no puddles or pin holes in finished coating.

d. All work shall be done using specialized sealcoating equipment. Hand work to be allowed only in areas inaccessible to equipment or to accomodate neat trim work at curb lines. A dedicated effort shall be made to protect all sidewalks, curbs and concrete aprons from spills, footprints or tiremarks.

e. The rubber fortified sealer shall not be applied when ambient temperature is below 50 degrees or falling, or when rain is imminent.

f. Sealed areas shall be barricaded from traffic and may be reopened in no less than 24 hours..

5. Parking Stripes - Total Number: 249

a. Provide one coat of synthetic zone marking paint with an alkaloid base. Striping shall be 18 feet in length and four inches wide. Maximum drying time shall be 50 minutes with 10 mil thickness with normal drying conditions.

a. X white b. _____ yellow

6. Handicapped Parking Signs (repaint):

a. Repaint handicapped parking sign emblem, as specified.

This product or a comparable may be used for seal coating and asphalt repair.

SEAL-MASTER SEALER

CHARACTERISTICS OF SEAL-MASTER'S COAL TAR EMULSION SEALER
(Government Spec. RP-355d)

Seal-Master's coal tar emulsion sealer (black) is a coal tar compound fortified with inert mineral fillers and emulsified into a homogenous sealant. It consists of coal tar, inert mineral fillers, additives and water.

The chemical percentage by weight breakdown is as follows:

	% Weight
Coal Tar (+/- 2.0)	32.00
Mineral Fillers (+/- 1.0)	19.00
Additives	.50
Water (+/- 2.0)	48.50
Total	100.00

NOTE: The suggestions contained in this Technical Characteristics Sheet are based on data which are believed to be reliable. They are offered in good faith, to be applied according to user's own best judgement. Since operating conditions in the processor's plant from whom we purchase raw materials are beyond our control, Wikel Manufacturing Company, Inc. cannot assume responsibility for any risks or liabilities which may result from the use of its products.

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Certificate of Test

Seal & Stripe
9b

ITL

ABORATORY NO: A-22

DATE RECEIVED 12/1/85

IATERIAL: Seal-Master Coal Tar Sealer

SPEC. NO. RP-355d

'O:

'EST METHODS:

he procedures employed were as designated in the above specification or as designated in ASTM D 1010.

IATA AND REQUIREMENTS:

	TEST	SPECIFICATION	RESULTS
.1	Material	Material shall be homogeneous and show no separation or coagulation that cannot be overcome by moderate stirring.	Passes
.2	Chem. & Phys. Analysis		
	Water Percentage	53 Max.	48.80
	Non Volatiles, %	47 Min.	51.20
	Ash Non Volatiles, %	30 - 40	37.00
	Solubility of Non Volatiles in CS_2, %	29 Min.	42.10
	Specific Gravity 25° C.	1.20 Min.	1.205
.3	Drying Time	8 Hr. Max.	Passes
.4	Adhesion & Resistance to Kerosene	No Penetration or Loss of Adhesion	Passes
.5	Adhesion Resistance to Water	No Penetration or Loss of Adhesion	Passes
.6	Resistance to Heat	No Blistering or Sagging	Passes
.7	Flexibility	No Cracking or Flaking	Passes
.8	Resistance to Impact	Waived	
.9	Resistance to Volatilization	10% Loss in Weight Max.	Passes
.10	Wet Film Continuity	Smooth, Nongranular Free From Coarse Particles	Passes

ONCLUSION:

he submitted sample meets the detailed requirements of Fed. Spec. R-P-355d in respect to all performed sts.

[illegible]

We certify that the above are the results as determined by us on the designated sample.

ndustrial Testing Laboratory
220 South Campbell Street
Sandusky, Ohio 44870

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Per Mike Mace
Quality Control Dept.

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This product or a comparable may be used.

SEAL-EX-V.M.

DESCRIPTION: Seal-Ex-V.M. is a nitrile rubber latex/silicone resin blend specifically designed area viscosity modifier and film performance enhancer for coal tar pitch emulsion. Seal-Ex-V.M. swells and thickens coal tar pitch emulsions to facilitate the suspension and uniform distribution of sand slurry mixes. The rubber/silicone resin blend imparts improved water and solvent resistance, flexibility, abrasion resistance and color.

Seal-Ex-V.M. conforms to the latex rubber requirements in FAA Specification P-625 dated July 14, 1983.

TYPICAL PHYSICAL CHARACTERISTICS:

Color:	Light Green
Odor:	Mild
Polymer Type:	Acrylonitrile-Butadiene
Acrylonitrile:	30-49 Parts
Butadiene:	51-70 Parts
Average Particle size:	1200 Anstroms
Silicone Resin:	3% based on rubber content
Specific Gravity:	1.0
Solids Content:	40%
Viscosity @ 25 degrees celsius	40 centipoise

USES: Seal-Ex-V.M. was not designed to increase the coverage rate but rather to facilitate the application of sand slurry mixes and to improve film characteristics. When mixed as per the dilution chart, Seal-Ex-V.M. will accommodate higher sand loadings and dilution rates. The sand slurry mixture will exhibit excellent viscosity characteristics for ease of application, keep the sand uniformly in suspension during application and provide uniform distribution of the sand in the dried sealcoat application.

Seal-Ex-V.M. will cure faster resulting in a long-lasting, resilient black application. The nitrile rubber provides for improved sand retention and the silicone resin improves water resistance.

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SURFACE PREPARATION: Surface must be free from dirt and dust. Wipe up or scrape excessive build up of oil, grease or gasoline spots. Treat oil, grease and gasoline spots with Seal-Master Petro-Seal (refer to Technical Bulletin No. 4-0013R7).

MIXING PROCEDURE: Charge the undiluted sealer in the mixing tank and dilute with potable water while agitating. Predilute Seal-Ex-V.M. 50% by volume with water (1:1 ratio) to avoid polymer shock and to facilitate uniform dispersion. Add prediluted Seal-Ex-V.M. slowly while agitating. When the rubberized mixture has thickened, add the sand slowly. Mix thoroughly before and slowly during application.

This product or a comparable may be used.

SEAL-MASTER TOP TUFF

DESCRIPTION: Seal-Master's Top Tuff is an anionic latex emulsion designed to modify coal tar sealer to enhance resistance from oils, fuels and grease. Top Tuff is a small particle size emulsion which imparts outstanding toughness and flexibility of the cured dried film.

USES: When mixed as specified with coal tar sealer, the modified product is usable on any asphalt surface which withstands high concentrations of traffic or oils and gasoline. Excellent for industrial and commercial parking lots, driveways, airports, walkways, traffic safety islands and service stations.

Top tuff is not a product designed to stretch sealer usage. It is a MODIFIER that gives extra toughness, improved adhesion for latex stripping materials, flexibility and added resistance to oils, fuels and grease in high traffic areas.

COLOR: Milky White.

SURFACE PREPARATION: Surface must be free from dirt and dust. Wipe up or scrape excessive buildup of oil, grease or gasoline spots. Treat oil, grease and gasoline spots with Seal-Master Petro-Seal (refer to Technical Bulletin #4-00137).

MIXING: Mix thoroughly before using.

APPLICATION: Recommended modification of coal tar sealer with Top Tuff varies and is dependent upon the type of end use and the amount of traffic. Use 1 to 2 gallons per 100 gallons of undiluted coal tar sealer. Do not over dilute the modified coal tar sealer with water. Specific recommendations based on individual situations are available from Wikel Manufacturing Company's Technical Department or a company representative.

Pour sealer into machine tank, then add proper amount of potable water. While mixing, add Top Tuff slowly and mix to uniform consistency. Then add desired amount of silica sand and mix thoroughly before application.

COVERAGE: Depends on specific application.

This product or a comparable may be used.

HOT CRACK FILLER

Melting

Start Up: The kettle should be oil-jacketed and equipped with an agitator. Both the oil bath and melting pot must be equipped with separate thermometers. Add small amounts of Crack Master 3405 when first starting to melt. The plastic protective film is designed to melt so that there is no need to attempt to separate it from the Crack Master.

On Going: Add additional Crack Master to the kettle as cracks are being sealed and the level in the pot drops. Temperature of the material must not exceed 410 degrees fahrenheit. Recommended temperature to fill cracks is 390 degrees fahrenheit.

Joint Preparation

New Construction: All joints must be free of water, dust, dirt and other foreign materials. Use compressed air to blow out cracks.

Maintenance Sealing: Follow recommendation as described above for new construction. If old crack sealant is present, it is necessary to route to a depth of 1" to 1 1/2".

Application

Apply Crack Master at air temperatures to 40 degrees fahrenheit or higher. Add only enough material as will be needed for the day or for the particular job. Small quantities of unused material can be left in the pot for remelting. All lines should be cleared while material is hot.

Precautions

Overheating above 410 degrees fahrenheit could cause the material to gel within the application equipment. Immediately begin removal and discard material if it begins to show signs of increased viscosity accompanied by stringiness.

Coverage

One fifteen pound block will seal approximately 130 lineal feet of a 1/2" wide x 1/2" deep crack.

Packaging

Four convenient to use 15 pound blocks per carton. Each block is encased in a specially designed plastic film which will melt and become part of the crack sealer.

This product or a comparable may be used.

FLEX-MASTER POURABLE CRACK SEALANT

DESCRIPTION:	An elastomeric asphalt emulsion cold pour crack sealant used to fill cracks up to 1/2" in width. Maintains excellent flexibility at temperatures as low as -15 degrees fahrenheit on asphalt and concrete surfaces.
USES:	For any asphalt surface, including parking lots, airports, driveways, tennis courts, play areas, walkways, basketball courts, traffic safety islands, playgrounds, paddleball courts, squash courts, golf cart paths.
COLOR:	Black, when dry.
SURFACE PREPARATION:	Surface must be dry, clean and free from all loose material, dirt and dust. For cracks exceeding 1/2" in width, use Seal-Master Trowel Grade Crack Filler (refer to Technical Bulletin #4-0015R8). For deep cracks, fill base with sand to within 3/4" of asphalt surface.
MIXING:	Stir well before using. Do not dilute. Use as is.
APPLICATION:	Pour into cracks. Fill cracks completely and allow to harden before sealing. Set time is dependent upon temperature, humidity and filler thickness. For best results, apply on dry surface when surface temperature is not expected to drop below 50 degrees fahrenheit or exceed 120 degrees fahrenheit. Material must be at or below surface level when application is completed. Before material sets up, scrape excess from surface and use rubber squeegee, rounded or V-shaped preferably to assure below surface contour of finished application.
COVERAGE:	Approximately 300 - 400 linear feet of 1/4" x 1/4" cracks.
CLEAN UP:	Wash tools in water. If material has dried, use kerosene.
CAUTIONS:	Stir before using. Keep from freezing. Do not store in direct sunlight or where temperatures exceed 100 degrees fahrenheit. Do not apply if rain is evident or forecast. Container should be closed when not in use.

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PACKAGING: Five-gallon pails and 55-gallon drums.

WARRANTY: The statements made on this technical bulletin are believed to be true and accurate, and are intended to provide a guide for approved construction practices. Wikel Manufacturing Company, Inc. does not make, nor does it authorize any agent or representative to make any warranty, express or implied, concerning this material.

WORKSHEET

SEALCOATING FOR WOODBRIDGE I

	LOCATION	MEASUREMENT/TOTAL		TYPE OF REPAIR
1.	All drives and parking	X	=	SEALCOAT DRIVES
2.	spaces except for main	X	=	
3.	drive between 10th street	X	=	
4.	and Pete Ellis drive	X	= APPROX 12444 Sq. Yds	
5.		X	=	
6.	Parking Stripes	X	= 249	Repaint Stripes
7.		X	=	
8.		X	=	
9.		X	=	
10.		X	=	
11.		X	=	
12.		X	=	
13.		X	=	
14.		X	=	
15.		X	=	
16.		X	=	
17.		X	=	
18.		X	=	
19.		X	=	
20.		X	=	
21.		X	=	
22.		X	=	
23.		X	=	
24.		X	=	
25.		X	=	
26.		X	=	
		TOTAL	=	

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Special Notes:

a. Asphalt repairs and sealcoating shall be completed within spacified number of working days after bid acceptance.

b. Final acceptance inspection to be done by GGMC official with the contractor.

c. Contractor is to provide a copy of insurance liability and Workman's Comp with bid.

d. Contractor is to provide three, work related references with bid.

e. The contractor shall be responsible for safe working conditions with daily and complete job clean up.

f. All workmanship is to be guaranteed for one year.

ACCEPTANCE OF TERMS AND CONDITIONS:

Contractor ____________________ Date ____________________

GGMC ____________________ Date ____________________

WOODBRIDGE I
Project Name

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